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THE FOUNDRY

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We want to obtain examples of current foundry practice. Photographs, drawings and descriptive matter, showing just what is being accomplished in the foundries of to-day, will be cheerfully paid for.

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Trade Outlook.

A few months ago every manufacturer was busy figuring out how to meet the demands for his product. Enlargements were the order of the day. People who used castings in considerable quantities built their own foundries in order to get prompt service. Blast furnaces that had been idle for years were put in commission. In short everybody was preparing for a great year and only wishing the day had more than twenty-four hours.

To-day production is being curtailed. From a scarcity of pig iron we are now accumulating a surplus, and the coke supply is increasing. The molders who are looking for a job are growing in number. Why the change?

The fact that there is a scrap on hand in China or that this is a presidential year should have but little or no influence. We need as many machines, as much fuel and clothing as we did a year ago. There are as many improvements projected as before, and needed ones too, and yet we all of a sudden cease to do business at the previous rate.

Why did we work night and day a few weeks ago, put on extra hands, speed up the machinery to the last notch? If there is a surplus of everything, why did we break our necks in producing it?

There is no doubt but that many plants are compelled to shut down for repairs after a protracted period of forced activity. But there is also no gainsaying the fact that many concerns are greatly reducing their working forces for lack of orders. Probably the most sensitive barometer in the iron trade, and the one which most readily responds to changes, is the malleable business. No branch of the foundry business was crowded any harder to fill orders and none at the present time are complaining as loudly as the malleable men that there is not enough work to keep their shops a-going at anywhere near their full capacity. The agricultural people too are closing their works for annual overhauling in advance of time and re-opening will in most cases depend upon the outlook a few weeks hence. The stove manufacturers have reduced their working forces almost universally and do not manifest the activity which characterized them a year ago.

The market may be said to have passed completely from the producers to the buyers' side. There is but little uniformity in quotations, the latter evidently being made to suit individual requirements.

The decline in pig iron has been considerable since December, at which time the top was reached. Iron is being delivered that was purchased when prices were considerably higher than at present, and, of course, the buyer feels that his contracts are a loss to him, but generally they are living up to their contracts and taking the iron, especially in the east. It has not gone from their minds that all along last year, when

iron was advancing, they were having iron delivered to them that was bought at the extremely low prices of some months before. Indeed, iron is being delivered now that was bought before the rise, and the contracts show that the prices were even below the market of today.

Quotations are so largely nominal that figures show but little, prices being made to fit the occasion—in no case above quotations. Alabama iron is perhaps better sustained than any other make, for the reason that considerable is going into export, the furnaces of that region being better situated to take advantage of freights in the holds of cotton steamers.

More Than One Cause for Dispute.

As far as the foundries are concerned the general situation is at this writing somewhat befogged on account of the uncertainty which exists as to the course that will be pursued by the molders in some of the prominent foundry centers. The refusal of the members of the National Founders Association to continue the paying of the temporary bonus in effect during May and June has so far resulted in open rupture only in Cleveland, but there is no saying how widespread the trouble may become.

Ostensibly this is a fight for an increase of wages, and yet to one familiar with the conditions it appears as if the matter of wages would be easily disposed of but for several restrictions and regulations which certain locals have seen fit to enforce upon the employers within their jurisdiction.

In spite of all assertions to the contrary, the effect of the labor unions has been towards bringing its membership to one common level, and the Iron Molders Union, at least in certain localities, has been no exception to this rule.

Because one workman is more competent than another and is able to concentrate his physical and mental abilities in a larger degree and consequently capable of doing a piece of work in far less time, is this any reason why the union to which he belongs should attempt to hold him down to the common level through fines and other punishments.

There is not an employer but who recognizes that a workman who can earn five dollars a day is a great deal cheaper to employ than two workmen who can only earn two dollars and a half each. In order to keep the individual from receiving that which is due him we find edicts issued by his union limiting his earnings per day to a specified sum. We find that workmen are not allowed to perform a certain amount of work in less than a given time. Can such arbitrary rules encourage progression?

Interference with individual rights will probably in the future be a larger factor of disturbance between the molders and their employers than any other item.

Charging a Cupola.

BY EDWARD KIRK.

A charge is the term or name commonly employed to designate a layer or body of iron, placed in a cupola upon the fuel employed in melting, and also to indicate a layer of fuel placed upon a charge of iron, for the purpose of melting the next charge of iron.

The placing of fuel and iron in a cupola in this way is designated charging. In preparing a cupola for melting, after the lining has been repaired, sand bottom put in, etc., shavings and wood are placed in the cupola for the purpose of igniting the fuel. Upon this wood a sufficient amount of fuel is placed to fill the cupola to from twelve to twenty inches above the top of the tuyeres after the wood has all burned out and permitted the fuel to settle upon the sand bottom.

This fuel is designated the bed; and the bed is the most important factor in charging, for if the bed is not right good melting cannot be done in any cupola, no matter how perfect the construction of the cupola may be.

The shavings or other material used for lighting the wood should be evenly distributed over the bottom in such a manner that it will ignite the wood in every part of the cupola at the same time.

The wood placed upon the shavings should be split fine, so that it may be readily ignited. Upon this a layer of coarser wood should be placed, and upon this a still coarser layer until all the wood necessary for lighting is placed in the cupola. When placing this wood in the cupola the melter should go in and arrange every stick of it, so that

it will burn freely, and not permit fuel to fall to the cupola bottom until every stick of wood is burned and the fuel evenly ignited.

When the cupola is so small that the melter cannot go in to arrange the wood, it should be arranged from the front or tuyeres, and that thrown in from the charging door should be cut very short and carefully placed when dropping it in. These details for placing wood in a cupola may seem a little superfluous to some, but they are not. For the writer knows from personal experience that fully one-fourth of the men employed in melting do not know how to make a fire in a cupola, and a great deal of poor melting can be traced to this cause.

The entire wood for lighting up is frequently thrown in from the charging door; no care is taken in placing it; one-half of it stands on end, and when fuel is thrown in a great deal of it finds its way to the sand bottom before the fire is lighted.

This does not give an even light to the bed, and a bed not evenly burned will not melt evenly on the start, and may not melt evenly through an entire heat.

The extent to which a bed is burned before charging iron is also an important factor in melting. It is not necessary to burn a bed to dry daubing, or warm up a cupola for melting; for the daubing will be dry by the time the bed is ready for charging, and the cupola will be warm enough by the time the blast goes on without burning any fuel for the purpose of heating it.

With a good fire in the fuel at the tuyeres, when the fire is beginning to show through top of bed, and the smoke burned off so that top of bed may be readily seen, the bed is ready for charging.

The height or distance the top of bed should be above top of tuyeres, when wood is burned out and bed ready for charging depends upon the kind of fuel used, volume of blast, etc. With anthracite coal, height of bed is from twelve to fourteen inches; and with coke, from eighteen to twenty inches. These measurements vary to some extent with the volume of blast; a light blast requires a lower bed, and a strong blast a higher bed; and the exact height for bed must be determined for each cupola by experiment.

This may be done by starting with a bed of the above measurements, and increasing or decreasing the amount of fuel to a limited extent at each heat, until the exact amount of fuel required for a bed is determined.

One of the best indicators that a bed is of a proper height is the length of time required, after the blast is put on to produce molten iron at the spout.

With a bed of proper height and properly burned before charging, molten iron should appear at the spout in from three to five minutes after the blast is put on.

If a greater length of time is required, then the bed is too high, and every minute of time over five minutes represents the time required to burn up surplus fuel, which is a loss of not only fuel, but also of the time required to remove it from the cupola before melting can be done.

The writer has frequently met melters and founders who believed that to melt iron hot the blast should be on for from fifteen minutes to half an hour before iron appeared at the spout.

The majority of these men had probably never seen a ladle of hot iron or a cupola properly managed. There is nothing more absurd in cupola management than to blow for this length of time before iron is melted; for as hot first iron can be produced at the spout in five minutes as can be produced after blowing for half an hour before iron is melted and the amount of fuel consumed with the blast on for this length of time is sufficient to melt a good sized charge of iron, and had better be employed in melting it.

To obtain iron at the spout in five minutes or less time, charging should be begun at least two hours before blast time, that iron on the bed may have an opportunity to become heated, preparatory to being quickly melted before the blast is put on.

This gives iron on the bed the same preparatory treatment as other charges of iron throughout the heat, which are heated by escaping gases before settling into the melting zone. When charging begins the front should be put in, and all tuyeres but one tightly closed, to shut off the draught and prevent further burning of the bed before the blast is put on.

The rule for charging is to place upon the bed a charge of iron equal in weight to about two and one-half or three times the weight of fuel in the bed. Thus, if 1,000 pounds of

fuel is placed in the bed, the first charge of iron would be 2,500 or 3,000 pounds.

This rule works very nicely when tuyeres are placed at a proper height, but when placed eighteen or more inches above the bottom, or when two rows of tuyeres are placed in a cupola, this rule does not work. And when weight of charges are not furnished by manufacturer of the cupola, these weights must be determined by experiment.

In such cases a good plan is to begin with the charge of iron on the bed equal to weight of fuel in bed, and increase or decrease the weight of iron each heat, until the exact weight of iron the bed will melt properly is found.

After the proper weight has been determined for the first charge of iron, the following charges may be the same, but are generally made one-fourth or fifth lighter than the first charge.

The weight of fuel in charges is determined by the weight of iron in the charge, and is ten per cent of its weight. Thus if 2,500 pounds has been found to be the proper weight for charge of iron on the bed, the next charge of iron should be 2,000 or 2,500 pounds, and the charge of fuel 200 or 250 pounds, and so on throughout the heat.

The rule is to melt three to one on the bed, and ten to one on the charges, and after the first charge on the bed, the charges of both fuel and iron may be made of the proportions above indicated, or they may be made lighter, and frequently are, as some cupolas appear to melt more evenly when the charges of iron are lighter, and charges of fuel are put in more frequently.

Whether the charges are made heavy or light, the ten to one rule should be adhered to, and weight of charges should be varied until this per cent of fuel gives hot, even iron throughout the heat, and the cupola melts a continuous stream of iron as large as it is capable of melting.

When the charges have been arranged, the next important matter to be considered is the placing of iron in the cupola. To obtain an even quality of iron at the spout, too great care cannot be taken in charging, for this is the first step in mixing irons when melted in a cupola. This is an important matter that does not appear to be fully understood by melters, and irons are frequently placed in cupolas without any regard to mixing them, under the impression that irons mix when melted; which is not the case, if irons are not placed so that they come in direct contact with each other in small bodies, as soon as melted.

When not mixed in charging, and the iron drawn close in small ladles, the different grades of iron charged may be drawn from the cupola and found in the castings without having mixed with each other, and this is frequently the cause of hard and uneven castings.

No rule can be given for mixing irons in charging that will hold good in all cases, owing to the great differences in iron melted for the various classes of work.

In some foundries pig is melted with only a limited amount of remelt scrap; in others the remelt is more than fifty per cent of the entire heat; while in others the greater part of the heat is old scrap.

When melting pig with a limited amount of remelt scrap only, the pig should be placed on the bed and charges of fuel, as should also pieces of scrap that are as heavy as pig, and on this a limited amount of light scrap should be placed. Each charge of pig should be made as level as possible on top, and the light scrap evenly distributed over it. When charged in this way the scrap melts at the same time as the pig, and a thorough mixture of the pig and scrap is effected at the spout.

When charging pig of different grades no two pieces of the same grade should be placed together if it can be avoided. This gives a better mixture than when all of one grade is placed on one side of a cupola and another grade on the other side.

The pig should be placed with one end toward the lining as far as possible, and the side of a pig should never be placed against the linings, for pig so placed is protected to a greater or less extent from the heat by the lining, and does not melt so freely as when fully exposed to the heat, and is frequently found lodged over the tuyeres in cinder, adhering to the lining.

When melting pig with a large per cent of remelt, such as small gates and light scrap, the pig should be broken into four or more pieces, for pig melts from the freshly broken ends, and when broken short melts more readily, and may be melted almost as quickly as gates and other foundry scrap that is.

protected to a greater or less extent against melting by a coating of sand.

The charges when heavy should be divided into from two to four parts or drafts, and a layer of pig placed upon the fuel, upon this a layer of scrap, upon this a layer of pig, and so on until the entire charge is put in.

When pig and a large per cent of scrap are mixed in this way in charging, a better mixture is obtained at the spout than when all the pig is placed upon the fuel and the scrap on top of it.

When melting old scrap and pig the manner of charging must depend to a large extent upon the character of the scrap. When the scrap is heavier than the pig it should be placed upon the bed and fuel in the charges, and the pig on top of it. If the scrap is as heavy as the pig, it should be mixed with the pig. When light and in small quantities, it should be charged on top of the pig; and when fifty per cent or more of the heat is light scrap, it should be mixed with the pig in the same manner as when melting a large per cent of gates and foundry scrap.

In all cases when melting thin scrap, such as stove plate, a few plates should be placed upon the fuel to prevent it from being broken up when throwing in the heavy iron.

A poor heat was never melted because the melter failed to put up the bottom doors, put in a sand bottom, light a fire, or to charge fuel and iron. It is not the failure of the melter to do these things that causes poor melting, but his failure to look after the small details in doing them.

CAST IRON NOTES.

Devoted to inquiries from Practical Foundrymen on the subject of Melting and using Cast Iron. Address all inquiries to W. J. KEEP, care of The Foundry.

Shrink-Holes in Castings.

Question.—We are experiencing difficulty with our gas engine cylinders and heads. The mixture of iron we are using for this class of work is as follows: Soft steel scrap, 15 per cent; car wheel scrap, 15 per cent; common scrap, 27½ per cent; Trussville charcoal pig (2½ per cent silicon), 42½ per cent. This mixture shows a chill from ¼ to ⅜ inches deep. The trouble is where there is a heavy body of iron which has to be drilled, as shown at X in Fig. 1, representing a cylinder head, that sometimes after these holes are drilled a small shrink-hole will appear, through which leakage occurs when the casting is subjected to pressure during testing. The main body or barrel of the cylinder shows no defect.

Fig. 2 gives a general view of the jacket core used in our cylinders, and shows where this leaves a heavy portion of iron at certain parts of the casting which are later drilled and tapped for bolting to the head. Two of these heavy pieces are drilled at X from the outside into the barrel of the cylinder, when leakage will occasionaly appear.

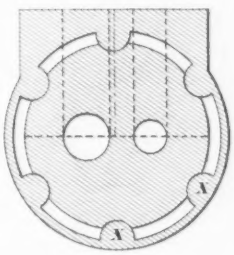


Fig. 1

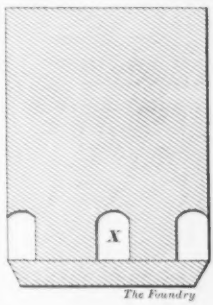


Fig. 2

Answer.—As no trouble is found with the surfaces being hard and unsound, probably the shrink-hole would disappear if a small chill piece were placed in the core. This would cause the surface of the thick portion to solidify as quickly as the thinner parts. A small percentage of aluminum placed in the ladle before the iron was put in would prevent any tendency to blow and would make the grain more uniform. Some small pieces of ferro silicon placed in the ladle would produce a similiar result.

Crude Oil for Melting Iron.

Question.—I would like to know if crude oil has ever been used for melting iron in a cupola. In our town coke is worth $15.00 per ton, while oil can be bought for $1.25 to $1.50 per bbl. How would it work to use coke and then force the oil in to the cupola under 100 lbs. pressure, throwing it in a spray with the air against the metal and burning coke. If the iron would be too hot, increase the iron on the charge.

Answer.—I doubt if crude oil could be used in a cupola successfully. It would produce heat enough, but just before iron melts it becomes somewhat plastic and the different pieces settle down into a large, compact mass which would prevent the flame from

passing through. If a properly constructed crude oil burner were used the flame would melt the iron that it touched, but one object in using a cupola is to cause the absorption of the waste heat by the charge that is above the melting point. This portion of the iron would settle together, but would probably not settle down to the melting point. It would not be a good idea to mix coke and the flame from oil together, because the coke must be burned before the iron above it can melt, and the flame would have a tendency to prevent the air reaching the coke to burn it. A reverberatory furnace is the best form in which to melt iron with crude oil. In such an air furnace the iron lies under the flame and can be melted perfectly. Many years ago I patented a cupola having the fuel outside and the flame blown in at each side near the bottom. The iron began to melt very soon, but in a few minutes no iron came and no flame could be forced through. The bottom was dropped, but nothing went down. It was necessary to cut away the lining to get the iron out, which was in nearly a solid mass. The thing was a dismal failure. The radiant heat from the incandescent coke does more towards melting iron than the flame, and for this reason it is much more expensive to melt in an air furnace than in a cupola.

The Tops of Stoves Pitting and Scaling Off.

Question.—We would like to know if you can give any reason for the tops of some stoves pitting out, or scaling off. This has been open for argument out here and we are looking for information.

Answer.—This happens once in a while and is due to careless usage. Stoves in a damp wash room that are used a part of the time are rusted rapidly from the soapy water that boils over on the top. Frying any kind of salt meat, especially pork, will rust the top of a stove. Baking in the oven salted articles where the salt will scatter, will soon pit the iron.

For these reasons such cases of rust are often reported from the far South.

The salt air of the ocean is very hard on any stove, and if salt has once entered the grain of the iron rusting will continue indefinitely and rapidly.

I have known of a few cases when none of these things seemed to have occurred. In one case it was the kind of stove blacking that had been used.

In another bags of salt had been piled on the stove, and in another the stove had been loaded in a car that had lately been used for salt.

In any case, the cause had been salt at some time, or the silicate of soda used in soap.

It is never due to any peculiarity of the iron. This is proved by the very few such cases complained of.

Does Iron Swell in Cooling?

QUESTION—I use a yoke for measuring the shrinkage of my test bars. The length between the chilling surfaces is a little more than 12⅛ inches. I find it impossible to get a shrinkage low enough to suit me, and I wondered if the yoke had not become more or less strained by use.

ANSWER—It makes no difference as to the distance between the chilling surfaces. They were intended to be 12⅛ inches; so that the shrinkage of ⅛ inch would make the test bar 12 inches long. Most iron shrinks more than ⅛ inch to the foot, so that a little more or less distance between the surfaces of the yoke ends would not affect the measure of the shrinkage.

The yoke could not in any way have been strained. As the mold is filled with liquid iron the portion at the ends of the mold flows against the iron faces of the yoke ends. In an instant the iron that touches these surfaces becomes solid, while the rest of the bar is liquid. The heat from the melted iron of the test bar is transmitted to the body of the yoke, which lies parallel to the test bar and less than an inch away. This lengthens the yoke, which carries the surfaces away from the ends of the test bar. As soon as the test bar ceases to be liquid it begins to shrink, and the ends are pulled still farther away from the surfaces of the yoke.

Many very delicate tests have been made, and all have shown that the ends of a test bar of one inch cross-section or less never touch the surface of the yokes after the first instant of contact.

All that the yoke is used for is to insure a definite length of the test bar of molten iron; to show how deep a chill the iron will take, and to allow the difference between the length of the test bar when liquid and when cold to be measured.

This is the shrinkage per foot. If the shrinkage does not vary the quality of the casting does not vary.

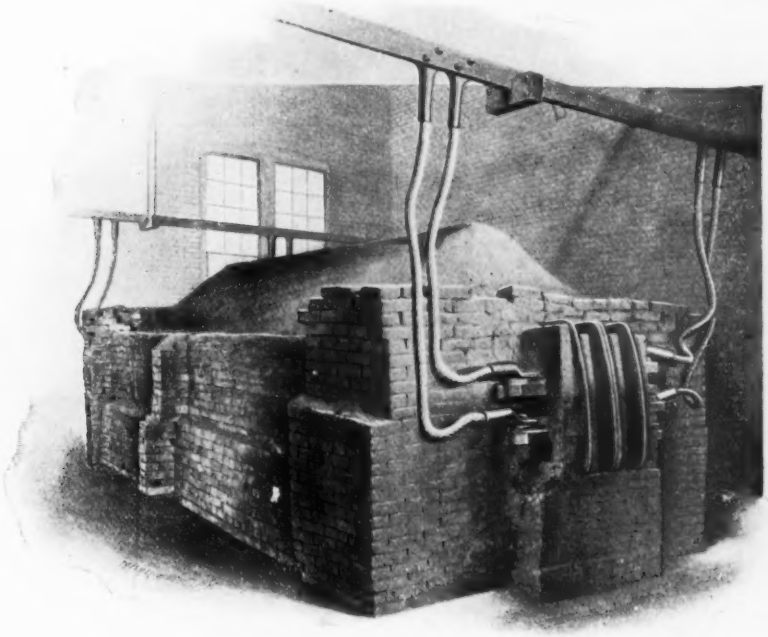
Carborundum.

(*Carbide of Silicon.*)

BY L. J. GRAY.

Less than ten years ago Mr. E. G. Acheson was engaged in some experiments having for an object the artificial production of crystallized carbon. At the conclusion of one of the experiments he observed a few bright blue crystals clinging to one of the electrodes of his improvised furnace. These were at first supposed to be crystals of pure carbon, but further investigation showed this to be impossible, and a chemical analysis revealed the fact that a hitherto unknown substance had been produced. Its constituents were carbon and silicon, united in the proportions of the atomic weight of the two elements, which proved that it was a true chemical compound, the carbide of silicon.

The remarkable physical properties of these crystals at first engrossed the entire attention of the discoverer, and the possibilities latent in the new substance as a chemical reagent were overlooked. The crystals were found to be intensely hard—as hard as diamonds—quite brittle, absolutely infusible, and insoluble in all ordinary solvents, acids having no effect upon them. It was at once realized that these were the characteristics of an ideal abrasive, and that if the substance could be produced on a large scale it would posses a very great commercial value. In seeking a distinctive name by which it might be generally known, these were naturally the ruling considerations. At that time the best abrasive known was the mineral corundum, next to the diamond the hardest substance found in nature. As carbide of silicon exceeded corundum in hardness, and carbon, an element not present in any of the natural minerals used as abrasives, was one of its two constituents, the combination of the two names into the one word "Carborundum" was made, suggesting at once the similarity in physical characteristic and the difference in chemical composition.



A CARBORUNDUM FURNACE.

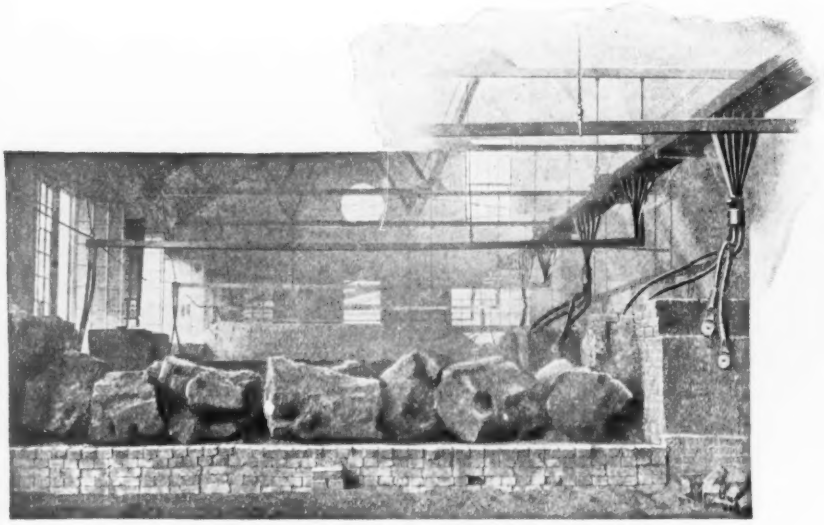
The development of the manufacture of carborundum has consisted chiefly in improvements in details of apparatus and operating methods, to bring the cost of production down to a point which makes it commercially available. The type of furnace now used was early adopted. The first experiments were conducted in a crude form

of furnace in which the heat was produced by the formation of an electric arc; but this was soon abandoned in favor of a furnace of the so-called "incandescent" type. In this the material to be heated surrounds an electrical conductor, which is heated by the passage of a current through it, and receives its heat from the latter.

Carborundum is made in the United States and Canada by The Carborundum Company, which owns all patents relating to it. There are two plants, both at Niagara Falls, but on opposite sides of the river. The plant on the American side is the more important, and the description of operations and the illustrations relate to it. It may be noted in passing that the only other concern in the world manufacturing carborundum is a company in Austria, which controls the patents for part of continental Europe.

The crude materials from which carborundum is made are essentially only coke and sand. The mixture charged into the furnaces consists of coke, sand, sawdust and salt, the two latter substances being introduced for a reason to be presently stated. A good quality of blast-furnace coke is used, and the sand is necessarily a very pure variety, analysing at least 99 per cent silica. The coke is finely ground and thoroughly mixed with the other materials in proportions determined partly by theoretical considerations and partly by experiment. This mixture is then ready to charge in the furnaces.

These are unique, and one who had not seen them in operation would scarcely think the name appropriate. They consist of two heads, or ends, built of fire-brick, about six feet high, eight feet wide and three feet thick, with a space about eighteen feet long between them. These heads have built into them at the center, a number of carbon blocks, extending through them in the direction of the length of the furnace, and securely clamped outside in iron castings together with metal connections for the electrical conductors. The heads are connected by two walls of loose fire-brick, so that there is formed a large open box, having the heads for ends, the walls for sides, and the floor for a bottom, with no top, eighteen feet long, six feet wide and six feet high.

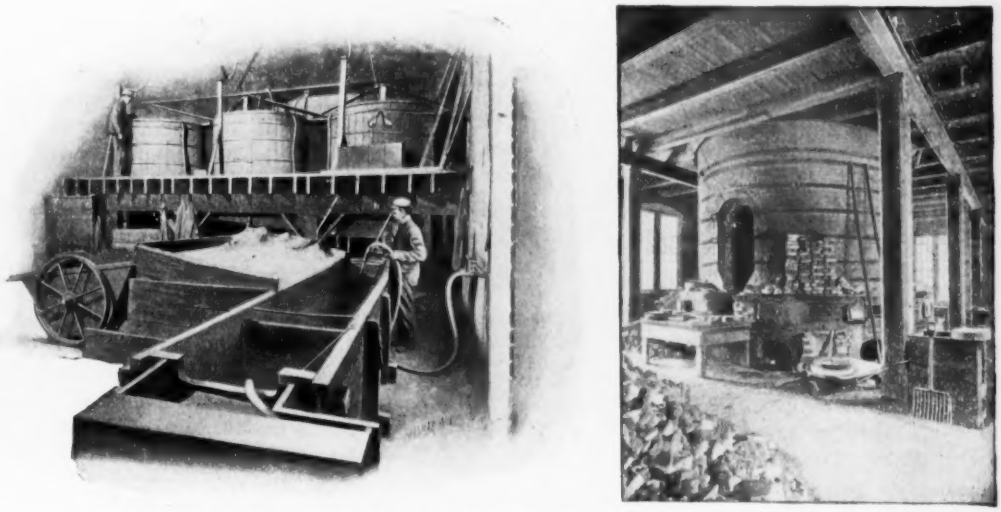


A CARBORUNDUM FURNACE OPENED, SHOWING THE CARBORUNDUM.

This box is filled to the top of the walls with the mixture, which is then hollowed out in the center in the form of a trench, about eighteen inches wide, and deep enough to expose the ends of the carbon blocks in each head. The trench is filled with coarsely ground coke, the pieces being about the size of a pea, which forms a core eighteen inches in diameter extending the whole length of the furnace and connecting the two sets of carbon blocks. More mixture is then piled on, being carried up in the form of an inverted V to a height of several feet above

the walls. When the work of filling the furnaces is finished, the electrical connections are made at the ends. The circuit is completed through the carbon blocks in the heads and the core of coarsely ground coke.

The electric current employed in each furnace is the equivalent in energy of one thousand mechanical horse-power. It is generated by water power in the great station nearby, and after transmission at a high pressure, is transformed to a low voltage, which forces a current of from seven thousand to nine thousand amperes through the core of the furnace. The effect of this enormous current is to heat the core just as the filament in an incandescent lamp is heated.



PROCESSES AND APPLIANCES FOR THE MANUFACTURE OF CARBORUNDUM.

It has been estimated that the temperature attained by the core is not less than 6,000° F. What this means can be conceived only by recalling the temperatures attained in familiar cases. The temperature of the iron in the hottest zone of a foundry cupola does not exceed 3,000° F., and near the tuyeres of a blast furnace 3,500° F. Platinum melts at 3,200° F. It is the necessity of reaching this high temperature which makes the electric furnace indispensable in the manufacture of carborundum. The heat from no other source can be concentrated in a sufficiently small space to produce temperatures such as are readily obtained by the use of the electric current. Just how wonderful the concentration of energy is in these furnaces it is interesting to consider. The duration of a heat is thirty-six hours, so that thirty-six thousand horse-power hours of work are done in heating the coke core and the surrounding mixture. This is more than sufficient to haul a heavy passenger train from New York to Chicago and back at the rate of speed of the Empire State Express.

The first effect of the heating of the core is to burn out all the sawdust in the mixture and to fuse the small quantity of salt. This results in making the whole mass porous, and permits the gases which are formed to escape to the outside, at the top and through the crevices of the loose brick walls, where they burn freely. They consist chiefly of carbonic oxide, with small quantities of other gases, depending upon the impurities in the materials. Then, next the incandescent core, a chemical action is begun which is only imperfectly understood. The silica is reduced, its oxygen uniting with part of the carbon in the coke, and the silicon set free in the form of vapor. In this state it combines with carbon, and condenses in crystals.

After a run of thirty-six hours, the electrical connections are taken down, and the furnace is allowed to cool by stripping off the walls. When the mass has become sufficiently cool to work, it is broken up, and the inner portions exposed. At the center is found the granular core, changed to pure carbon, and ready to be used again. Surrounding this, in the form of a shell about

twelve inches thick, is the crystalline carborundum, the crystals being held together in a mass which is quite readily broken up. Beyond the zone of crystalline carbon is another of amorphous carborundum, the heat not having been sufficient to complete the conversion. This amorphous material can be used in place of the mixture in a furnace and converted into a quantity of crystalline carborundum.

On the inner surface of the shell of crystalline carborundum, next the core, there is found a film of pure graphite. This phenomenon is interesting for two reasons. It points out the probable explanation of the non-occurrence of carbide of silicon in nature, for this artificial graphite has been formed by the decomposition of carborundum, the carbon being deposited in the graphitic form, showing that the temeperature at which carborundum decomposes is very little higher than that necessary for its formation. Apparently the heat conditions in the earth's crust have never been exactly right for the making of carborundum. In the second place, it is the basis of another new industry —the manufacture of graphite artificially from coal. This has a future of great promise.

The carborundum crystals when taken from the furnace are of various shapes, some like needles, but most of them flat plates, with almost perfect hexagonal outlines. The coloring is usually black, but films are formed on their surfaces which show iridescent colors like those on a piece of tempered steel, of a brilliant lustre.

The masses of crystals are crushed under heavy rolls in a grinding pan, and the grains thus formed washed to remove impurities, dried and sifted into the various sizes required. In this form carborundum is sold like emery, for grinding and polishing, or it is put on paper and cloth, or made into wheels. The latter part of the business absorbs most of the carborundum used for abrasive purposes. The grains are mixed with a binding material consisting of certain fine clays, formed under heavy pressure in iron molds, and fired for some days in a pottery kiln. It thus results that a carborundum wheel is essentially a disc of fine porcelain in which is embedded a quantity of carborundum in the form of grains. After firing, the wheels are dressed to size and shape, tested and inspected and then packed for shipment. The composition of the wheels is varied both in the size of the carborundum grains used, and in the proportions of the binding materials. In these ways it is possible to produce wheels for every kind of work, from the coarse hard wheel for snagging castings to the fine wheels used by glass workers, and the soft wheels used on tempered tools.

As was mentioned before, the use of carbide of silicon as a chemical reagent was not originally contemplated. But when it was observed that it dissolved readily in molten iron, immediate steps were taken to bring it to the attention of metallurgists. This has been done so successfully that there is now a large and increasing amount sold to steel makers, both in the United States and Europe. It is now being introduced to the foundrymen of this country, as a substitute for high silicon irons—"softeners"—at present used in melting scrap. Its advantages are several. As its content of silicon (in the form used in cupola practice) is about fifty per cent, the advantage derived from the saving in weight to be handled compared with a six per cent silicon iron, is obvious. It reduces all iron rust in the charge, carrying off the oxygen in the slag and increasing the output of the cupola by preventing a waste. It makes a hot, clean-flowing iron, which renders the production of fine sound castings from an inferior burden easy. The use of carbide of silicon in foundry practice was treated more at length in a recent issue of this magazine, and those interested would do well to consult that article.

A visit to the works of the Carborundum Company is well worth while to any who may find it possible to make it, either from mere curiosity regarding one of the most remarkable scientific discoveries of recent years, or from a practical interest in the production of a material which is invaluable to the metallurgist and the manufacturer.

Cupola Practice.

BY EDWARD B. GILMOUR.

The name of this style of furnace was originally derived from a cupola or dome leading to the chimney which is now frequently omitted. Cupolas are made in sizes ranging from 18 inches to an unlimited diameter to suit the requirements of the founder,

and in nearly every foundry there are two or more cupolas, a small one for every-day use and a large one for running off special large heats. Some furnaces are made oval in shape and others round, the former is very objectionable as the flat sides usually become loose and cave in; the latter is the best, as it is a complete arch, and is thereby stronger under the heavy strains of expansion and contraction.

The cupola furnace has a great advantage over all other kinds of furnaces in use for melting iron cheap and quick from a small quantity to an unlimited amount with very little fuel. The cupola does not improve the quality of the iron in melting, but in this age of keen competition every one is trying to get the best results as regards quality and quantity, but principally the former. There has been very few improvements made upon the cupola compared with the other improvements which have been added to the foundry. I remember the old style of furnace with the single tuyere on each side, blowing direct into the furnace, which gave very good results, but now we have them built with multiple rows of tuyeres, which is a great improvement.

In good cupola practice there is a loss of heat units to the extent of about 25 per cent. and in order to have perfect combustion we must supply a sufficient amount of oxygen to the amount of carbon in the cupola, as when a substance containing carbon burns in an insufficient supply of air, oxidation of the carbon is not complete, and the product instead of being carbon dioxide is carbon monoxide; consequently there will be a great loss of fuel in not using all the heat units capable of being produced according to the amount of fuel supplied. If we add at different stages in the cupola more oxygen to produce carbon dioxide we will have as near perfect combustion as may be expected from a cupola. Too much blast is attended with an increased consumption of fuel per ton of melted metal, which chills the furnace and causes it to scaffold; on the other hand, too little blast is attended with a loss of heat. Before dropping the bottom it is good practice to throw two or three shovelfuls of small bituminous coal into the cupola; it causes an intense heat and runs a large amount of the slag into the bed, which drops clean and saves a great deal of chipping in the morning. In using coke for fuel use only the best in the market in order to have the best results. Poor coke fills the furnace with slag, and impregnates the iron with sulphur. In one incident I remember we had a large quantity of iron to melt, and having run short of good coke we were compelled to use an inferior grade. The result was slow melting, dull iron, and when all the iron was melted the cupola tender came running to show me what had happened. The slag had accumulated so much and without having any resistance of fuel and iron in the cupola the blast completely lifted the slag up in one mass until it flowed out through the charging door and flooded the whole charging scaffold.

The irregularities in the working of the blast furnace caused Mr. Hart to make an inquiry as to the causes affecting it and the cupola. He ascribes some of the irregularities to differences in atmospheric pressure; thus the range of the barometer in that country (Great Britain) being about three inches, or rather more than one-tenth of the mean pressure, this change of density would produce a difference of one-tenth in the bulk of the air; and, therefore, between a severe frost with the thermometer at 20 degrees and sultry weather with the thermometer at 70 degrees, the difference would be 50 degrees; and as atmospheric air dilates or contracts one four hundred and eighty-fifth part for every degree, this difference in temperature would produce a variation of rather more than one-tenth in the mass or bulk of the air; so that, if during severe frost the barometer stood at thirty-one inches, while during sultry weather it stood at twenty-eight inches, the combined effects of the difference in temperature and pressure would amount to a total variation of one-fifth in the bulk of the blast, which would be nearly equivalent to a careless furnaceman putting into his furnace ninety pounds of coal instead of one hundred during a whole casting. Indeed, the difference from temperature and pressure amounts to something like an irregular charging of the furnace with ninety pounds up to one hundred and twelve pounds indiscriminately, instead of one hundred pounds regularly.

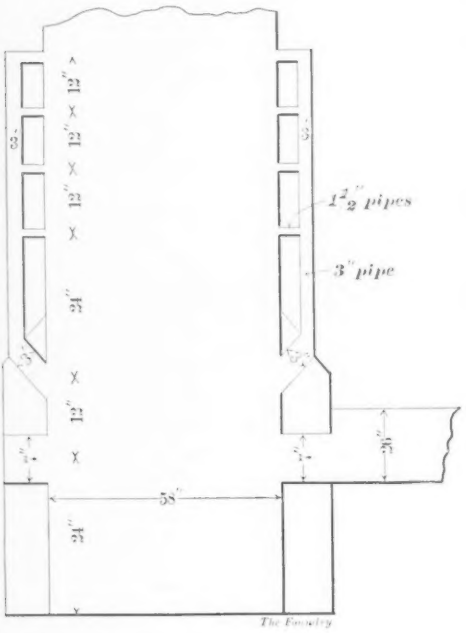
These observations of Mr. Hart are certainly worthy of attention; the impression of the effect of moisture in the air is still

as firmly held as ever. Taking the average of five years, selected at intervals of the same period, for twenty-two years working, the following quantities of coal were consumed for every ton of crude iron produced:

	Winter.	Spring.	Summer.	Autumn.
	Cwt.	Cwt.	Cwt.	Cwt.
Foundry iron furnace..	49.7	52.2	53.1	55.4
Forge iron furnace....	43.6	44.2	44.6	45.8
Blast iron furnace.....	43.2	44.1	50.1	49.5

In the first or foundry furnace, the excess of autumn over winter months is eleven per cent; in forge furnace equal to five per cent, and in blast fifteen per cent.

The value of these observations would have been increased greatly if Mr. Hart had given us a series of meterological observations in connection with these results.



The accompanying illustration is a sketch of one of the best designs of a cupola furnace; the size of the furnace inside of lining is 58 inches with six rows of tuyeres and six inlets into the cupola in each row. Any one who wishes to erect a cupola of this description can take a regular Collian or Whiting cupola and simply insert six 3-inch pipes into the blast chamber with four 1½-inch connections let into the cupola, as is shown in the sketch. This will increase the capacity of the cupola from nine tons to fifteen tons per hour, giving very hot iron for the finest of machinery castings with a consumption of fuel at a ratio of ten to one. This ratio could be increased, but in order to get good, hot and clean iron this is very good results. This kind of furnace will cause some surprise to a few of the readers of THE FOUNDRY, as the principle of multiple rows of tuyeres has been questioned at different times by some of its correspondents.

In charging a cupola of this kind allow 2,700 pounds of coke for the bed and 4,000 pounds iron; thereafter 350 pounds of coke and 4,000 pounds of iron, and after the cupola is well heated up reduce the charges of coke to 300 pounds.

Concerning Mine Car Wheels.

We are experiencing some trouble in making mine car wheels, which are 18 inches in diameter and weigh 115 pounds each, and should appreciate having the following questions answered by some of your readers: 1st. The proper analysis of the pig iron employed for such castings. 2d. The amount of machinery scrap that can be used in such a mixture. 3d. The best way to make a pit and how soon should the wheels be placed therein after they are poured. Will it do as well to allow the wheels to stand in the chills and flasks until morning as it would to put them in a pit? What should be the temperature of the pit when the wheels are placed therein?

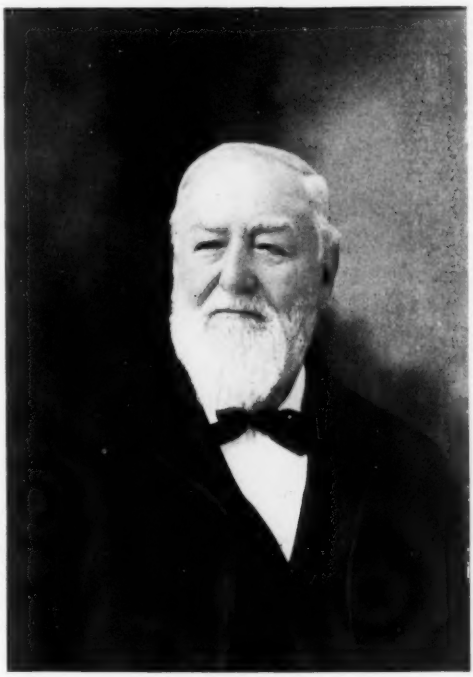
ACME MFG. CO.

Thomas Preston.

One of the oldest foundrymen in the country, and probably the oldest, when length of service is considered, is Thomas Preston, who a couple of weeks ago celebrated his fiftieth anniversary as foreman for Henry R. Worthington Hydraulic Works, of Elizabethport, N. J. Although in advanced years, he is to-day one of the most progressive men in the business, eager to adopt all new methods which appear to him practicable. His eyes are keen, and he needs no glasses to see the imperfections of molds or castings. He is very active and strong, is at his post every day, on his feet from morning till night, walking from one end of the shop to the other, giving to his men such instructions and advice as can only be given by a

man with his experience and fund of knowledge such as has been accumulated for the past fifty years.

Mr. Preston was born in Stoke, Hampshire, England, the 12th of June, 1820. He came to this country at the age of 21, and started to work for Boothouse & Abendroth, Port Chester, New York, what was then known as Saw Pits. He started as an apprentice on stove and hollow ware. After working there for three years, he next connected himself with Renwick & Ballar, making ship castings and windlass work, also large kettles for whaling purposes. We



THOMAS PRESTON.

next find him in charge of a foundry for Loftus, Wood & Co., Brooklyn, doing a jobbing business. He next connected himself with the firm of Henry R. Worthington, as foreman of their foundry department, in which capacity he had acted for fifty years the 12th day of June, 1900.

Mr. Preston relates a great many stories of his career with the Henry R. Worthington Co. He started with them when they only had two molders in the shop, and loves to tell of the old, crude methods and appliances they had in the earlier stages of his foundry career, one in particular, where they had a large water cylinder to cast, one of the first large castings to be used on a Worthington pump. He did not have brains strong enough to lift the ladle filled with iron, so a large ladle was horsed up alongside the mold, and as he did not have labor enough in the foundry to cast such a piece, he called upon help from the outside and the machine shop to aid in the pouring of this casting. It was a casting that a great deal of interest had been taken in, and its progress was watched by all the officials. As the mold was about half filled with iron the gas exploded and went off like a gun, and away jumped all the laborers and help and ran for their lives, leaving the mold half filled with iron, and of course the casting was a failure. Mr. Preston relates a great many such instances, and can entertain a modern foundryman for hours explaining his old, crude methods and appliances.

Mr. Preston was one of the first to appreciate and see the advantages of the new and modern ideas, and has been instrumental in developing a great many himself. He was one of the first to see the advantages of coke in melting. He also very early adopted the molding machine, and by the help of his varied knowledge the Henry R. Worthington foundry has become one of the leading users of the molding machine, and considering the variety of work there done on the machine of both large and small castings, it has probably no peer anywhere.

On Monday evening, June 11, Mr. Preston was tendered a banquet by his fellow-workmen and old associates to celebrate his 80th birthday and fiftieth anniversary with the firm of Henry R. Worthington. About 150 were present, and among this number were Mr. A. J. Caldwell, general manager, who cited Mr. Preston's foundry career for the past fifty years and paid a high tribute to the ability of Mr. Preston's foundry management and gave expression to the esteem in which Mr. Preston was held by all the officials of the company. Mr. W. F. Prince, superintendent of the foundry department, explained the difference between the modern foundry of to-day and the crude condition in which Mr. Preston found the foundry business over fifty-five years ago. At the close of Mr. Prince's remarks the committee of arrangements presented Mr. Preston with a solid gold watch, chain and charm, suitably engraved, and bearing the inscription, "Presented to Thomas Preston, to commemorate his 80th birthday and 50th anniversary with the Henry R. Worthington Co."

DON CARLOS SALZER, President. GUILLERMO DUEELS, Vice President. WHITE NIXON, Secretary.
STAHLKNECHT & CIA, Bankers, Treasurers. Hon. Sir EDGAR CAMERON, Attorney.

The National Ore & Reduction Co.

(INCORPORATED)

P. O. ADDRESS, LOCK BOX No. 83.

WORKS:
Santuario DeGuadalupe.

Durango, Mexico, MAY 1 1900 1900

DIRECTORS.

HON. E. STAHLKNECHT,
German Vice Consul, Durango.

HON. W. H. FAULKNER,
U. S. Consul, Durango.

SENOR JAMES WARK,
Prop'r Hotel "San Carlos."

EDWARD RAPP,
Cashier Banco de Durango.

SENOR WHITE NIXON,
Late Editor Honesdale, Pa. "Observer"

HARVEY KLINE,
Consulting Agent.

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F. INGOLD,
106 California Street, San Francisco
Agent for California.

Howard Chemical Works,
ST. LOUIS, MO.
General Agents for the United States.

JENSHIRO MATSUSHITA,
Osaka, Japan, Agent for Japan.

All orders and correspondence should be addressed to

...THE...

NATIONAL ORE AND REDUCTION CO.
LOCK BOX No. 83.
DURANGO, MEXICO.

Dear Sir: We again call your attention to the merits and softening qualities of our

Nickle Manganese Calcium Fluoride.

It is absolutely the best Metal Flux for fluidity and the foremost in the world for giving purity, ductility and softness to metal, and is fully protected by patents in Mexico and the United States.

It has been adopted by 6 National Governments, 28 Railway Companies, and nearly all the up-to-date Foundries, in Europe and the United States.

We desire to have you test this Flux, and in order that you may do so to your satisfaction, will upon your request, send by mail, postage prepaid, 1-lb sack—sufficient for an 80-lb metal test in ladle or crucible. The mail carrier will deliver it at your place of business!

SHALL WE SEND IT?

As a special inducement we will forward eight 1-lb sacks direct from our Durango works, postage prepaid, on receipt of one dollar, U. S. Currency.

Sincerely Yours,
White Nixon, Secret'y.
THE NATIONAL ORE & REDUCTION CO.
DURANGO, MEXICO.

The Flux Fakirs.

We show on this and adjacent pages a fac-simile of a circular issued by the flux fakirs of Durango, Mexico. As will be seen by the address thereon, the foundries of England are now being made the target of the efforts of this concern to increase the consumption of its questionable product.

We have in our possession a large number of letters showing that the stuff with the sneezing name is absolutely worthless. In addition, we also have letters from sev-

NICKLE MANGANESE CALCIUM FLUORIDE

Is prepared and manufactured exclusively by the NATIONAL ORE AND REDUCTION CO., DURANGO, MEXICO.

Patented in the United States Sept. 15, 1891. Patent No. 458,494. "A composition of chemical matter for the purification and strengthening of cast iron and steel." Also patented Nov. 15, 1898, in the Republic of Mexico. Patent No. 1,478. All infringements will be prosecuted to the full extent of the law.

During the past two years we have received orders from and supplied 2,972 foundries, iron and steel works in the United States, Canadas and Europe with our metal flux, Nickle Manganese Calcium Fluoride. Howard Chemical Works, Howard Station, St. Louis, Mo., General Agents for the United States. All communications should be addressed to The National Ore & Reduction Co., Durango, Mexico.

A FEW TESTIMONIALS.

Turner's Falls, Mass., May 4, 1898.

We have used your Metal Flux in both brass and iron castings with very satisfactory results.

CLARK MACHINE CO.

Buffalo, N. Y., May 5, 1898.

We have been using your metal flux for some time in Propeller Wheels and other castings with perfect success. H. G. TROUT & CO.

St. Louis, Mo., Aug. 14, 1898.

We recommend your Metal Flux, Nickle Manganese Calcium Fluoride for softening hard iron. We use it, and you are hereby authorized to add our name to its hearty endorsement.

THE STANDARD FOUNDRY CO.

New Castle, Pa., Nov. 4, 1898.

Recommending your Metal Flux, will say we have been using it for the past sixteen months with good results. In addition to softening, strengthening and cleaning the metal, we find it takes a high polish and the fibre is very close.

VULCAN IRON CO., LIMITED.

Pittsburg, Penna.

Referring to your inquiry would state that we have used Nickle Manganese Calcium Fluoride with good results.

ALEX. SPEER & SONS, Globe Plow Works.

St. Louis, Mo., April 24, 1896.

You have our order for a barrel of Metal Flux—Nickle Manganese Calcium Flouride—for shipment to our works at Edwardsville, Ill. Please do not wait until May 1st, but ship immediately.

N. O. NELSON MFG. CO., Wm. Ivy.

St. Louis, Mo., April 8, 1896.

Please enter our order for two barrels Nickle Manganese Calcium Fluoride, same as last recent shipment. As a metal flux and softener it beats them all. Kindly advise when we may expect delivery and oblige.

FLEUGER & HENGER MFG. CO. W. H. HENGER, Treas.

San Francisco, Cal., 1897.

Your Alloy Composite has given us perfect satisfaction, and does all represented. By the aid of this Metal Flux we have been enabled to turn out better castings than ever before.

THE JUDSON MFG. CO.

Conneaut, Ohio, Oct. 12, 1899.

Our order through your St. Louis, Mo., agency for 300 pounds Nickle Manganese Calcium Fluoride has been promptly filled and your new chemical compound put to a most severe test, and we take pleasure in stating to the world that it has all and more real merit than is claimed for it. Truly, for foundrymen, you have accomplished a great good and filled a long-felt want. We take great pleasure in recommending such goods as you have furnished us.

Respectfully yours, CONNEAUT IRON FOUNDRY.

Telegram Address, "Dubs, Glasgow." Glasgow Locomotive Works, Glasgow, Eng., Feb. 22, 1896.

Please supply us with 700-pound barrel Metal Flux—Nickle Manganese Calcium Fluoride—same as supplied us as per your invoice of Sept. 29, last year. Yours truly,

DUBS, Treas.

The Damascus Steel Co., Denver, Col., March 1898.

Gentlemen—The 700-pound barrel of Nickle Alloy Composite sent me has done all you claimed for it. It is in every particular the best Flux ever used, adding about 50 per cent tensile strength to the castings. I shall want tons of it very soon.

Sincerely yours, A. J. SEVERANCE, Prest.

The Damascus Steel Co., Denver, Col., Feb. 28, 1900.

Gentlemen—I can use a quantity of your Nickle Manganese Calcium Fluoride, as I bought a barrel in 1898, and another in 1898, as you will remember. You will please enter my order for another barrel. Ship at once as directed and oblige.

A. J. SEVERANCE, 312 Quincy Building.

Spokane, Wash., Dec. 30, 1898.

Gentlemen—Kindly ship us one-half ton Alloy Composite, with direction for use. We used it several years ago and found it a good softener, and also a cleaner and strengthener, and want to use it again. We have been using Wft pig iron, but believe your Metal Flux is more economical and is fully as good. Ship quickly and oblige.

J. H. BOYD, Prest. NATIONAL IRON WORKS.

Spokane, Wash., May 15, 1899.

Please ship us another half ton Nickle Manganese Flux, same as last. It has proven the best softener with hard iron. We paid your draft on Jan. 27th last in payment for your former shipment. Kindly advise and oblige.

J. H. BOYD, Pres. NATIONAL IRON WORKS.

Osaka, Japan, Feb. 11, 1901.

Dear Sirs—Have received the 8 1-lb. sample sacks of Metal Flux. I had tests made with it in our Government Arsenal with 1,500 pounds of metal in a bull ladle, and the tests surprised us with 74 per centage of increase in tensile strength. Now I beg you to secure for me the agency for my country, Japan, and forward me 2000 pounds of Nickle Manganese Calcium Fluoride by fast freight, for which I enclose you $300.00 exchange. You will receive many more orders from my country, I assure you.

Faithfully yours, JENSHIRO, MATSUSHITA.

DIRECTIONS FOR LADLE USE.

IRON—Put 1 per cent in Flux, of the weight S. O. iron, into the bottom of the ladle and pour the molten metal upon it. The Flux will cause all impurities in the iron to rise immediately to the top in the form of "slag." The effect of the flux is to increase the heat to a large extent, rendering the metal more fluid, and hence, a wait of a few minutes before pouring will be beneficial. It is found that in the best qualities of iron, a less percentage gives better results. In some foundries ½ per cent of Flux is put in the furnace throwing the Flux on the coke, just before the iron is each layer, and the remaining ½ per cent in the ladle as above.

COPPER AND BRASS—Put one-half of 1 per cent in the bottom of the ladle and melt it with the metal. When the mass is melted throw a little of the Flux upon the top, which will prevent the evaporation of the copper, and keep it hot. It is recommended that the melt be made very hot, in order to fully fuse the Flux.

FOR CUPOLA USE—10 pounds of Flux to each 500-pound charge of iron in cupola.

FOR SOFT MILD STEEL CASTINGS—15 to 20 pounds of Flux or 2½ per cent to each ton of iron in converter.

FOR PROJECTILES—Use 100 pounds Flux, or 5 per cent, to each ton of metal in crucible.

FOR ARMOR PLATES, GRADE "A"—Use 340 pounds Flux to each ton of metal in converter.

FOR ARMOR PLATES, GRADE "B"—Use 300 pounds Flux to each ton of metal.

FOR PUDDLING FURNACE USE—Take 20 pounds Flux to each ton of metal.

FOR PIG IRON BLAST FURNACE USE—Take 25 pounds of Flux to each ton charge of ore.

FOR HOT AIR FURNACES AND MALLEABLE IRON USE—Take 20 pounds Flux to each ton of metal.

Britannia Co., Colchester, England.

The National Ore & Reduction Co. Durango, Mexico.

Elizabethtown, Pa., March 20, 1899.

Gentlemen—We have been using your Nickle Manganese Calcium Fluoride in our iron and it has given us entire satisfaction. As soon as our present supply is gone we will place an order with you for more. Yours respectfully,

BUCH'S SONS, Mf'rs [illegible] and Agricultur'l Machy.

NICKLE MANGANESE CALCIUM FLUORIDE

It is quite impossible to foretell what will be the ultimate effects of the development of Nickle-Manganese Calcium Fluoride.

Secretary Tracy is very enthusiastic on the subject, and is naturally gratified to be one of the pioneers in taking up the new alloy, which was first used as a material for armor plates, but now promises to enter into the composition of not only armor plates, guns and projectiles, but the hulls and engines of ships.—Power and Steam.

STRONGER THAN STEEL.

"Among the most valuable alloys known in the arts of metallurgy is Nickle Manganese Calcium Fluoride. It has been recently discovered that steel can be made 50 per cent stronger and iron 65 per cent. stronger by adding 1-2 per cent of this Metal Flux to the crucible or cupola."—Scientific American.

CAST YOU OWN TOOLS.

"After you get tired paying tool-makers to forge and grind tools, you may try and cast your own tools from old steel, scrap and Nickle Calcium Fluoride, in a crucible. They will take an edge like and not require grinding so often as forged tools."—Iron Age.

Address all communications to THE NATIONAL ORE & REDUCTION CO., Durango, Mexico.

eral people whose testimonials appear on the circular, which state that they have never recommended this material, and that the National Ore & Reduction Co. has appropriated their names without permission. This, doubtless, accounts for the fact that these people have received orders from 2,972 foundries—in their mind—for we are certainly loth to believe that the foundry fraternity contains that many gullible persons.

Gating.

BY PAUL R. RAMP.

The manner in which a mold is gated is of more importance in the production of good castings than is generally conceded. Very often what would be the proper way to gate one mold would not do for another. We must be able to judge which method is the right one to apply. Owing to the various shapes and sizes of castings it is im-

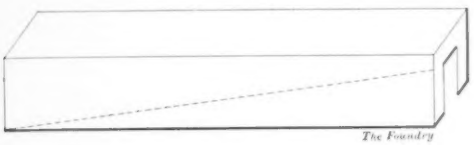


FIG. 1

possible to follow any set of rules. However, there is one item that will be of importance in all cases. It is this: Treat the gate as well as any other part of the mold. If you have one gate, all the iron required to fill the mold must pass through it, and if it is not properly vented, etc., it will cut or scab, the dirt going into the mold and make a dirty casting.

Fig. 1 represents a driving box shoe for a locomotive; these castings are required to be very clean and will not be accepted if otherwise. Fig. 2 shows us how this piece should not be gated, because the iron entering the mold at A rushes down the incline to B, and continues to flow over the exposed surface C until the mold is nearly filled. This has a tendency to wear and make dirt. Fig. 3 is the method my experience has shown is the most practical way of the two.

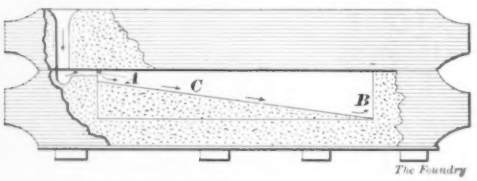


FIG. 2

The iron enters the mold at A and drops down to B, and gradually rises to C. In this manner we avoid the wear. When the first pound has been poured in, the metal no longer drops on the surface of the mold, but on the iron preceding it. This avoids the dirt that is generally very prominent in similar castings gated as shown in Fig. 2.

There is a limit as to the distance iron can safely be allowed to fall without injuring the mold. Take, for instance, in a case of

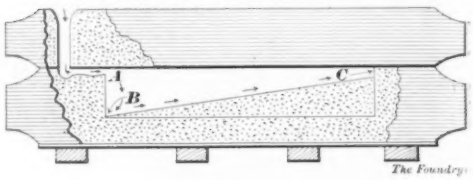


FIG. 3

a locomotive cylinder mold, as shown in Fig. 4; it would be bad practice to compel the iron to fall to the bottom. In this case it is advisable to use a gate, as shown at A, Fig. 4, which is the pouring basin, B the down gate, C the point where the gates open into the mold. This sketch does not show the cores except the main core and the piston valve core, as it is intended to merely illustrate the method of gating.

In gating a mold of this kind cut two small inlets at D. If this is done when the iron in the mold reaches this height the flow of metal will be direct from the ladle

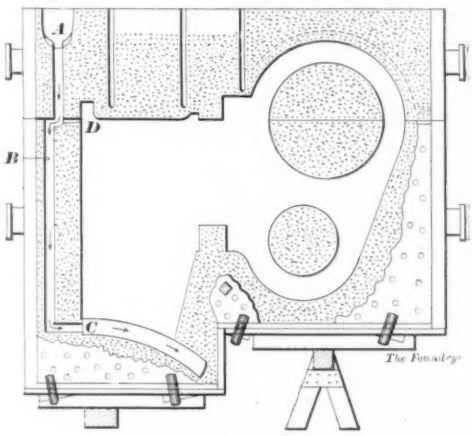


FIG. 4

through the gates spoken of. This avoids cold shuts should the iron be a little dull.

In building runners one must be careful to make them clean and not too hard. Should the runners be dirty the dirt will be washed into the mold; if too hard or wet it will cut or scab and make dirt.

Many molders swab around the gate pins in building a runner to prevent any loose particles from falling into the mold; this is an error; the wet sand from swabbing does harm by cutting, as the iron will not lay

to it. Fig. 5 gives an illustration of a runner on a mold for a round column. The letter A indicates the two down gates leading from the runner into the mold. In building a runner of this kind always form a basin, as shown at B, for the iron to drop into. This will give better results than without it.

To make clean castings two or more inlets leading from a down gate are to be preferred to one large inlet. The larger one is liable to carry the dirt and slag into the mold with the iron, the smaller one will hold it back. The fashion molders have of shoving a nail or two down in the center of a gate to hold back the dirt is an error which usually does more harm than good. Take, for instance, a cylinder head weighing about 300 pounds. I know men that do not believe this casting

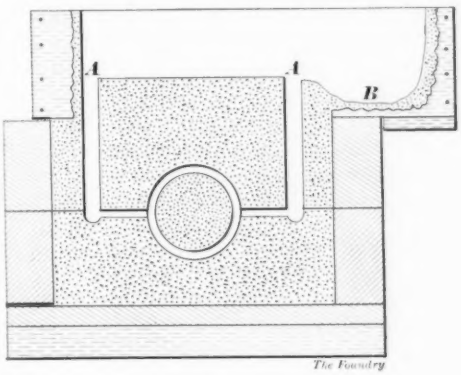


FIG. 5

could be made perfectly clean without sticking nails in the gate or inlet to hold the dirt back. Much better results may be obtained by leaving the nails out and reducing the size, but increasing the number of inlets leading from the down gate to the mold.

I know that the nail placed directly in the center of the stream of iron flowing into the mold will catch and hold the slag and dirt for a short time, but just as soon as the nail melts (as it often does) the nail and dirt clinging to it are washed into the mold. The molder being told of his bad work often wonders how it happened. It is a hard matter to convince some of the older molders of the soundness of this theory.

I have an old fellow that would not agree with me. The other day I took him into the machine shop and showed him a cylinder head he had made using the nails in the manner referred to above. The castings were turned up and several hard spots in the shape of nails were seen very plainly. I said, "Charlie, there are your nails you were using for skimmers."

Absolute Shrinkage.

BY WILLIAM ROXBURGH.

In a previous article, on "The Disintegration of Metals," I dealt at some length with shrinkage in its primary form, that is to say, the action which takes place with metals while passing from the fluid condition to that of the solidified state. And although this article treats of a branch of the subject referred to, it will have but little if anything in common with what has already been dealt with, as I shall only touch upon what takes place with shrinkage in its secondary form; or, to put it clearer, that which follows shrinkage from cherry-red solidification to absolute shrinkage.

The first question that is liable to present itself is how far does cast iron shrink? Cast iron being variable in its physical properties, is also variable in its shrinkage, hence it is that shrinkage develops according to its density; that is to say, iron that is more metallic and with less fusible constituents, or what is popularly styled impurities, shrinks more than the brands containing a higher proportion of the aforementioned elements.

The proportion of shrinkage to one foot of cast iron is generally recognized as one-tenth of an inch, but whether it be more or less it is of little moment to the molder. It is enough for him to understand that no matter how far a casting in cooling has to travel by shrinkage, it is of the greatest importance that such a casting be freed from any part or parts of its mold or cores, likely to interrupt its course in shrinking, and thus insure peffect safety from cracking, springing or bursting.

The further one penetrates this subject the greater becomes the necessity for knowledge and research, for nowhere except in a straight bar or tube can we find a casting which has not more or less irregular and undue shrinkage about it; therefore it is, that breakage in castings is frequently attributed to bad metal, whereas if the truth were known, it might be due to irregular shrinkage.

The most common types of castings showing the effect of irregular shrinkage are wheels and pulleys. Who with a lengthened experience has not at some time or other heard a casting go off with a crack. The responsible party offers his regrets for having failed to slacken the core, or it may be some other part of the mold which has held the casting from moving forward uninterrupted to absolute shrinkage.

The principal points involved and those to be reckoned with in this subject are "design," "equality of metal," "camber in bedding down," and "slackening." These four items are paramount in influence and I shall write of each according to my experience.

Design.

Fig. 1, with four equal sides with its diagonal bar, shows what might fairly be called a staying absurdity, and wherever employed gives evidence that whoever designed it has but scant knowledge of the effects produced by contraction. Diagonal bars may be serviceable, but are at all times mischievous to a greater or less extent in castings, and Fig. 1 shows in its worst form the results of unequal shrinkage. Take Fig. 1 as

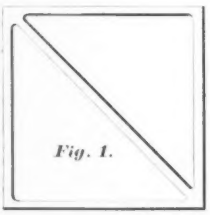


Fig. 1.

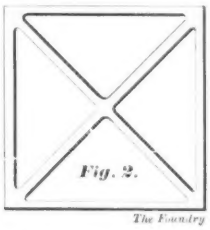


Fig. 2.

The Foundry

being 3 feet square and 1 inch thick. The measurement on either of the four sides is equal, but the diagonal bar may be roughly reckoned as one and one-half times that of either of the four sides, so that we may safely assume that there is one-half more shrinkage in the diagonal bar than in either of the four sides. Such being the case, we have 3-16 inches more shrinkage to contend with in the diagonal bar than in the sides of the casting, and if the latter does not break itself in moving to absolute shrinkage, it will be warped and unduly strained.

Fig. 2 may be looked upon as a better way of strengthening a casting, and experience has proven that results are more satisfactory than with the design shown in Fig. 1, but while admitting Fig. 2 to be superior, both are objectionable, the only difference being that in Fig. 2 the strain is balanced.

Equality of Metal.

"Equality of metal" is practically to be desired but not likely to be attained, and its influence for good in absolute shrinkage being admitted, it follows that the greater the equality the less undue strain will follow. Many cases could be cited in support of this, but the most common is that of the belt pulley with its heavy hub. Every practical molder knows it would be useless to expect these castings to keep from springing or snapping unless they be either split at the hub or every means adopted to expedite the cooling of the hub so that rim and hub may cool together. The method usually adopted to facilitate the cooling of the hub is to fettle out the core and make an application of cold water. Some engineers have an aversion to the use of water here, maintaining that cold water hardens the hub, thus making it objectionable to machine. I agree that unless the water be applied intelligently, it will work mischief. However, no one need be afraid of harm being done if they take care while applying the water to see that the hub returns to a greater heat in the bore than it possessed when receiving the last application of water. Another way in seeking to cool those castings evenly is to take off the cope and dig a gutter around the rim, and filling this with hot metal in order that the rim may retain its heat for a greater length of time. This plan of treatment is out of the ordinary, but illustrates the strategem that molders sometimes have to employ in order to secure good castings from ill-designed patterns.

Although the spur wheel type of castings is fairly unique in uniformity of metal, still when we consider the distribution of heat from its center, arms and rim, all of which must radiate towards the boss in absolute shrinkage, these give to it an individuality of its own requiring special treatment, consisting of splitting the hub with cores or plates, the former to my mind being preferable. Needless to say, that the splitting of the hub goes a long way in relieving the undue strain which otherwise would be on the rim, although this can be only removed entirely by splitting the hub between every two spokes.

Camber.

To camber a pattern in bedding down is to give it the necessary deflection, that the casting made therefrom will come out of the sand without being warped or twisted. Practical men are aware that there is no fixed rule to guide them here; it is all a matter of experience, gained through jobs previously passing through their hands, and even then the molder frequently receives surprises, for it does not always happen that two castings made from the same patterns and by the same method, shrink alike. The reasons for this are variable; first of all, there are atmospheric conditions to contend with, and for an example let us take a horizontal engine bed-plate—Fig. 3—which may be either 20 or 40 feet long; the size does not matter, except that in the greater length the danger of warping will be doubled. Suppose one end of the casting is in close touch with the door of the foundry and a strong wind blowing on this exposed part, while the other end is in comparative warmth, who could doubt but

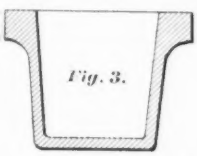


Fig. 3.

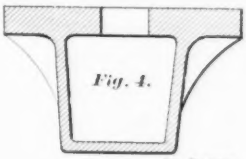


Fig. 4.

The Foundry

that the exposed end will cool much more rapidly than the balance of the casting. Again, supposing the camber to be one-half inch in a 20 feet length, that is, one-half inch deflection in the center, any changes made in the thickness of the metal would have to be reckoned with. Likewise the gates and risers should all be attended to so that these may be relieved from all possible gripping on the bars of the cope. And should a casting require more than two separate flasks to cover it, it is necessary to remove them before absolute shrinkage is accomplished.

So far we have only considered uniform designs with the usual attachments for binding bolts, cylinder feet and pillow block faces, and wherever there is nothing more than this to contend with, the difficulty of making straight castings is not extraordinary. The tendency, however, is to design regardless of the consequences attending absolute shrinkage. It has become quite common to cast onto the sides of castings projections of various forms which hitherto were jointed and bolted on and which consequently obviated the danger of warping. The only remedy for such castings is to clear the sand away from the heavier portions, and in this way facilitate equal shrinkage.

Fig. 4, although of a similar design as Fig. 3, is heavier along its base besides being boxed. If in bedding down this casting one were to camber by deflecting the middle, as in Fig. 3, this would be exactly the opposite of what is required to make a straight casting. This is because the heavier metal on the top side makes this the last side to shrink. If it were possible for castings to cool uniformly, there would be uniformity in shrinkage, and warping and twisting would give but little trouble. Heat at all times draws towards its center and in so doing follows the lines of least resistance.

Slackening.

In the former paragraphs I have dealt with the influence exercised by design, equality of metal and the necessity of "camber" in bedding down.

It need hardly be said that the need for slackening a casting is almost, if not altogether, confined to dry sand and loam work, and if many castings made in green sand were made in dry sand the need for slackening would be greater. Those who handle loam work should have a very clear understanding of absolute shrinkage, since the rigidness of loam molds compels the relieving of many parts to assist the casting to contract. For this reason the interspersion of loam bricks is frequently resorted to, although I do not favor such a system in a vertical built core, since this must at all times be a source of weakness. By far the better way is to distribute the equivalent of the loam brick space throughout the joints of the bricks in each course of the structure when there is the same amount of flexible material and no danger from weakness, which accompanies the location of loam bricks as above mentioned.

In studying Fig. 5 the reader will be aided by viewing it as a cylindrical casting, six feet in diameter with bracket attached. In this casting it may be asked when slackening should begin. The earliest possible time is generally late enough, and with the job in question, cherry-red solidification would be sometime past before the work of slackening could begin. Of course, it may be said by

many that slackening is not necessary, and I have even come across many who maintain that they have seen as much evil resulting from slackening as any good they ever saw it do. I cannot agree to this as my experience is all the other way. The barrel core in Fig. 5, or any other similar core, will yield to the extent of ⅝ or ¾ inch during the process of absolute shrinkage. Of course, a great deal depends on the intelligence of the molder who built the core, and if the metal was two inches thick, the danger of such a casting cracking through rigidity of

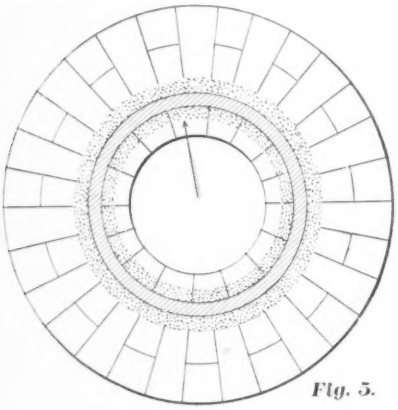


Fig. 5.

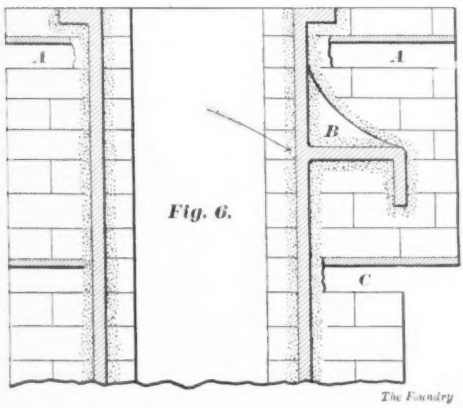


Fig. 6.

The Foundry

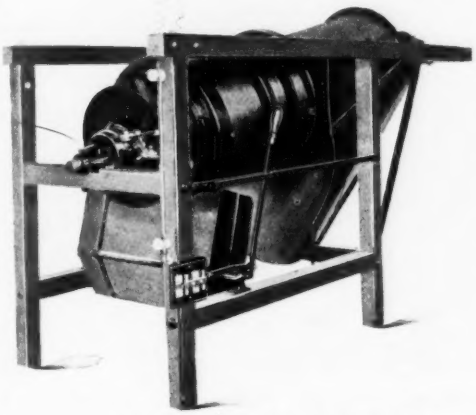
core might not be serious. But reduce the metal to one inch and slackening becomes an absolute necessity. In the two-inch metal we may assume there is double the strength and a consequent elasticity, which gives it more power while shrinking to crush, burn and destroy the vegetable and combustible elements in the loam from which the core is made. With one-inch metal we are quite safe in assuming that the half of this destructive power is lost, the latter being chilled more from cope and core, so that its structure becomes changed through being more densified, and as a natural consequence is hardened considerable, which reduces its elasticity and makes it impossible to withstand the necessary strain consequent on ¾-inch shrinkage. Then when its power to crush the core ceases before its work is done, and the limit of elasticity is gone, nothing can save the casting from snapping if it be not slackened, as shown at arrow, Fig. 5, and which consists of a vertical strip of brick being entirely cleared from top to bottom. This being done, the top should be covered across so as to prevent any cold air playing upon the part relieved, and if covered over no ill can possibly attend the operation of slackening.

I will conclude this article with a short reference to the vertical shrinkage of the same casting, as snown in Fig. 6, where there is something like 1½ inches of shrinkage to contend with, i. e., the top flange of the casting, upon cooling, ought to find its way somehow or other 1½ inches nearer the bottom than it occupied at the time of casting.

This amount of shrinkage must show that everything attached and likely to impede its contraction should be slackened, otherwise the results at best must be defective. At Fig. 6, underneath the top flange at A, will be seen the amount of slackening required. If a plain barrel with flanges at both ends and say 12 feet long, no matter whether a loam brick be built underneath the flange or not, it is necessary to slacken, as shown at A, Fig. 6, but if a bracket be attached, as shown at B, Fig. 6, it will be necessary in slackening to come down stepwise from the line of A, and get underneath the bracket at C. By doing as I have described here, it fulfils the double function of procuring a good casting, first by preventing it from cracking, and second, by insuring the metal's structure from being racked, thus improving what is naturally the weakest part of the casting. Care should be taken to see the claw or flange of the bracket has full liberty to shrink, otherwise the barrel may concave itself in that region. This may not be perceptible to the eye, although quite apparent when the boring bar has passed through, and will most likely necessitate its re-boring again before this faulty hollow part can be removed.

A New Machine for Saving Iron.

Thousands of tons of iron are annually wasted in the offal from foundries, and while this is well known and much effort has been made to reduce this waste, the amount of iron lost is astonishing. How to stop this waste is a problem that has engaged the attention of many progressive foundrymen. Some months ago the Barnard & Leas Mfg. Co., of Moline, Ill., began experimenting with a view to stopping the waste of iron in their foundry, and the result is a magnetic separator through which some surprising results are said to have been obtained. Their output of castings runs about nine tons daily, and they say that with their new machine they are daily saving from three to four hundred pounds of iron which was formerly carted



BARNARD & LEAS SEPARATOR.

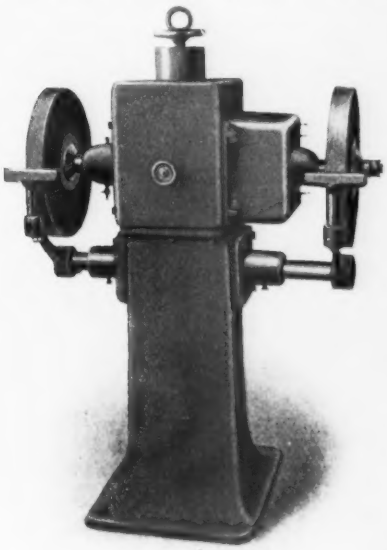
away with the cinders and slag. This showing made it seem that their foundry was wasting more iron than it should, and in order to test the matter, they procured about eight hundred pounds of cinders from a neighboring foundry, which they run through the machine. From this they obtained over two hundred pounds of iron. This surprising result decided the company to patent the machine and begin to manufacture them for sale.

They now have several machines in operation in different foundries, and all are giving the best of satisfaction. The machine is very simple and substantial in construction. The wearing parts are few and are made especially strong.

In operation the cinders and other refuse containing iron are crushed as is usual in a tumbling barrel, which has openings through which the crushed cinders and smaller pieces of iron pass, while the larger pieces are retained. These larger pieces of iron are cared for in the usual manner and the crushed cinders and dust are then passed through the separator. In the separator the fine sand and dust is drawn off through the revolving screen at the head of the machine. The remaining iron and cinders then passes into the magnetic separator, where the iron is retained and the refuse falls out at the tail of the machine. This operation continues until the machine is fully loaded with iron, when the current is switched off and the pure iron falls out into the receptacle provided for it. The lever controlling the switch also operates a deflecting shute which moves with the switch, and thus the refuse and iron is discharged in different places.

The Stow Electric Emery Grinder.

Our illustration shows a new machine lately placed on the market by the Stow Manufacturing Co., of Binghamton, N. Y. In many respects this machine differs from others built for a similar purpose. By a patented device the periphery speed of an emery wheel can be kept constant from 16 inches in diameter down to 10 inches, the speed regulation being so perfect that it can



be controlled even to the fraction of a revolution of the wheel.

As the wheel wears away the speed can be

proportionately increased, not by any abrupt change from one step cone to another, but just right so that it will cut to the best advantage on one hand and not pass the danger point on the other. The machine is provided with a simple locking device which is absolutely under control of the foreman or person having the key. No change in speed can be made by the careless workman, thus avoiding the consequent danger of the wheel bursting.

These machines are built in various sizes to meet different requirements, and being electrically driven may be placed in a situation most convenient to the work in hand without any expense being incurred for the changing of countershafts or belts. Further information about these tools may be obtained from the manufacturers, the Stow Mnfg. Co., Binghamton, N. Y.

Machine Molding.

BY GEORGE BUCHANAN.

In many foundries it is still the habit to mount only plain patterns on their machines, and castings which present any unusual features are left to be made by hand in the common way. The wheel illustrated in Fig. 1 is rather a tedious job to mold on the bench, and the day's work of a practised hand is a very little lot indeed.

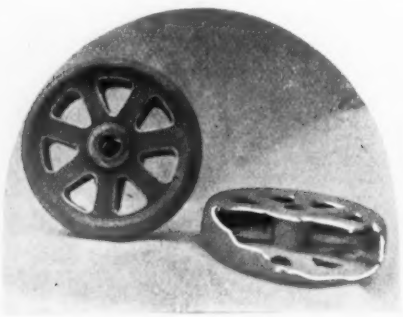


FIG. 1

This wheel is made in 13"x13" flask, the pattern parted through the center and mounted on a pair of stripping plate machines, drag on the one and cope part on the other. A plate is made same size as flask with half the core formed below its surface, the sides of top half of core being formed by loose ring located by pin and hole and top of core worked off with strickle working in hole in center of plate and resting on the outside surface so that when strickling top of core it also cleans superfluous sand from off the plate.

FIG. 2

The spaces between arms of wheel form stools on which the cores rest in the mold, these being formed on the outside portion of patterns, the core being level and plain both top and bottom. The core plate rests on a three-legged stand of convenient hight with a small shelf attached on which to place loose ring and strickle. Fig. 2 shows molder dropping lever previous to lifting drag off machine. The core is made by simply pressing sand with the hand into the core plate and strickling off, no venting being necessary (ten seconds being all the time required to make the core). The loose ring is next removed and drag placed on core plate as in Fig. 3; drag and core plate are lifted together and turned over on the floor, core

FIG. 3

plate is then lifted off. Fig. 4 shows molder just having lifted plate from off drag. A chill is placed in center print and top part dropped on Fig. 5.

Considerable trouble was experienced in adjusting these patterns, as the stools formed by the spaces between the arms

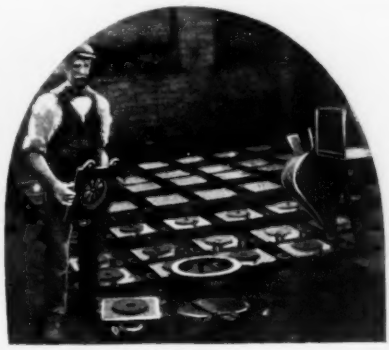


FIG. 4

must just touch evenly top and bottom, or core will drop to pieces if top part catches too keen or if not touching we have a fin between the arms. After a few trials, how-

FIG. 5

ever, the correct result was obtained and no further trouble experienced. The difference in the output in this case between hand and machine being as one to seven.

Incompetent Molders and the Apprentice Rato.

Referring to a recent conference between the Iron Molders Union and the Stove Founders National Defense Association the Journal of the former makes the following pertinent remarks concerning a theme there discussed:

The oft-repeated complaint that there is a serious insufficiency of competent stove-plate molders is something new to the molders who have not yet forgotten the long years of idleness through which they have passed, and the difficulties they usually experience in securing employment except in the few months of great activity in the stove trade. There was a scarcity of good molders in the fall of 1889, it is true, and there was a scarcity in nearly every line of labor in that period of unprecedented industrial activity. But no one expects that such a condition will be permanent, in fact many think that it is already passed. Why, then, should we legislate for an extraordinary condition or give it serious consideration when determining upon a desirable and necessary ratio of apprentices? Nor can the union be blamed for the glaring incompetency of some who travel as journeymen molders even though they carry a card. They are the product, as a rule, of those very shops that recognize no apprentice law and hire the cheap, able-bodied boy in preference to the man. One of the foundrymen admitted that not one in ten boys who started in his foundry remained long enough to become a journeyman. What became of the other nine? Did they leave the trade? Or do they profit by their brief experience and accept jobs at a little better wages in some shop that followed the same policy as the one they had left? In most instances they would follow the latter course and after a series of graduations, in which no desire was shown by his employers to perfect him as a mechanic, he would become a journeyman, in his own opinion at least, and add another to the list of incompetents who follow and degrade the trade.

A Twenty-Five-Thousand-Pound Foundry Ladle.

We illustrate herewith a large foundry ladle, designed by Antonio C. Pessano, general manager of the Geo. V. Cresson Co., Philadelphia, which possesses several points of more than usual interest.

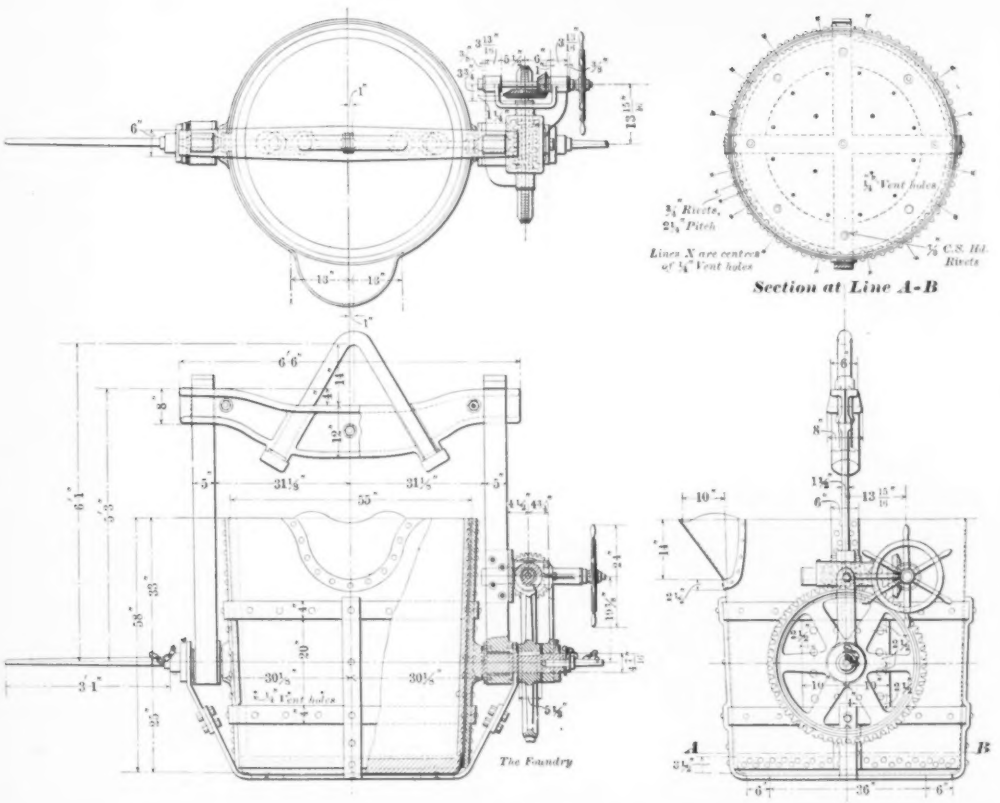
It is well known that when a ladle is filled with molten iron the bowl expands, and in the case of heavy crane ladles the side bars must move outwards. As the heads of bales for crane ladles are commonly designed, the side bars are not free to move outwards evenly throughout their entire length, the head of the bale remaining practically stationary while the side bars are forced outwards, through expansion of the ladle at the trunnions.

To overcome the strains thus set up and to avoid the at times difficult working of the ladle which this causes, Mr. Pessano de-

signed the inverted head of the bale shown in the illustration. The head is made from cast steel and the shape shown adopted to take care of expansion.

It will be noted that expansion will elongate the head of the bale and move the tops of the side bars out evenly and in harmony with the expansion of the bars at the trunnions. The easy working of this ladle at all times and conditions have proven its superiority of construction over the old style heads.

Among other points of interest in this ladle is the hand wheel, which is made from wrought steel, thereby avoiding all possibility of danger from breakage at a critical time. The ladle is fitted with roller bearings throughout, thus reducing friction to the minimum. It is double-geared and all bearings are protected against grit and dirt. The loop is made in one piece, the heads being forged solid. There are no nuts to work loose at any point. The trunnions are forged in one piece and riveted to shell. The double bands and vertical braces give the ladle a substantial appearance.



TWENTY-FIVE THOUSAND POUND FOUNDRY LADLE.

Porous Castings.

The Peterson Engineering Co., in a recent issue, ask how to prevent castings from becoming porous. Some seven years ago I had the same trouble in making castings for ammonia machines. The class of work we had to do was T pipes, return bend elbows, and couplings. They had to undergo a very heavy pressure of cold water. Now I don't know whether this firm asking how to overcome their trouble had to finish their work or not, but the style of work we were doing had to be turned up on the ends and a thread cut on them, so you see they had to be made of soft iron. One day we received word from the Ammonia Ice Co., stating that the goods were not satisfactory, so I was sent to investigate the matter and found out that although they were all right when they were tested by a pressure of steam but that when they put the cold water pressure on the castings would fairly tremble; you could hear a slight hissing sound and the water would come through the iron in drops about the size of a point of a pin. About three out of five castings were good. Where the trouble was, we were using too coarse a grain of Peterson Engineering Co. The way we overcame our trouble was to put eight pounds of manganese into a 150-pound ladle and melt common stove plate free from rust and dirt and poured these molds. Stove plate is a very close grain of iron and manganese softens the iron so they could be turned up all right.

HENRY TINGLEY.

A Novel Method of Molding Pipe Fittings.

BY WILBRAHAM JACKSON.

It was recently my good fortune to visit the Gleason & Bailey foundry at Seneca Falls, N. Y., a corner of which is but seldom thrown open to visitors. This embraces the core-room where are made cores for pipe fittings from three-fourths of an inch to twelve inches, such as T's, L's, X's, Y's and plugs. In these castings the threads are formed by cores instead of being cut by machinery, as is commonly the case. Girls are employed in making these cores, for which a machine is provided, and a very fine sand and oil are used in their manufacture. The core is originally made in three pieces, as shown in Fig. 1. The two end sections comprise the core print and the threaded portion, the central piece the plain part. In this central section of the core there is a core iron employed, having a nut at each end, into which is fastened the threaded stem seen in the end cores.

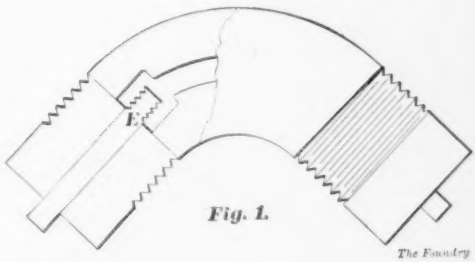


Fig. 1.

The method of molding these cores is shown in Fig. 2, where A is the table of the machine. On this is placed a collar B, which forms the core as far as the threaded portion. On this is placed another collar C, which contains the threads to form that part of the core. After these two sections of the core box are rammed up with sand and levelled off, the plug D is screwed down on the top of the core about one-fourth inch, which makes the sand hard. Afterwards the collar C is screwed off the core, following the

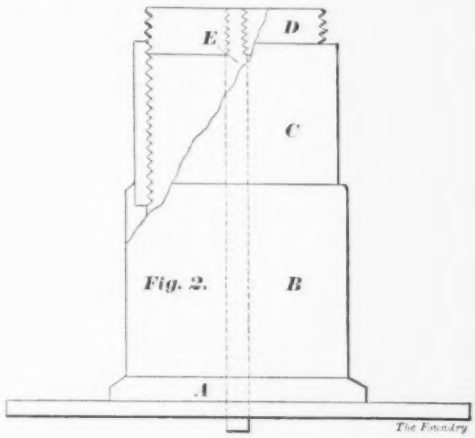
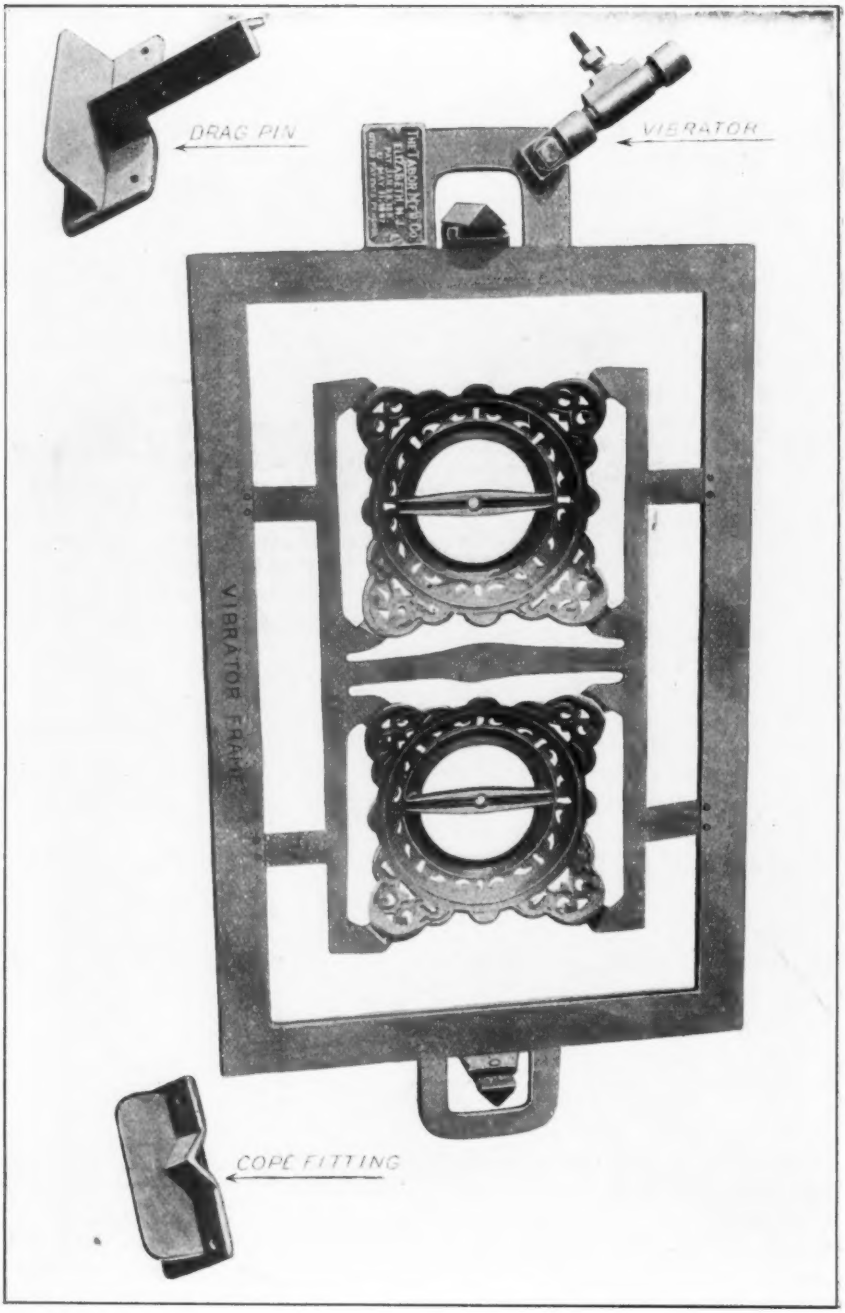


Fig. 2.

threads in plug D. When this is done, the plug D is lifted away and the core left in the collar B in which it is dried.

The manufacturers claim that they can make a core this way as quick as they can make it in the ordinary way and that they therefore save the whole expense of cutting these threads by machinery.



VIBRATOR FRAME OF THE TABOR MOLDING MACHINE.

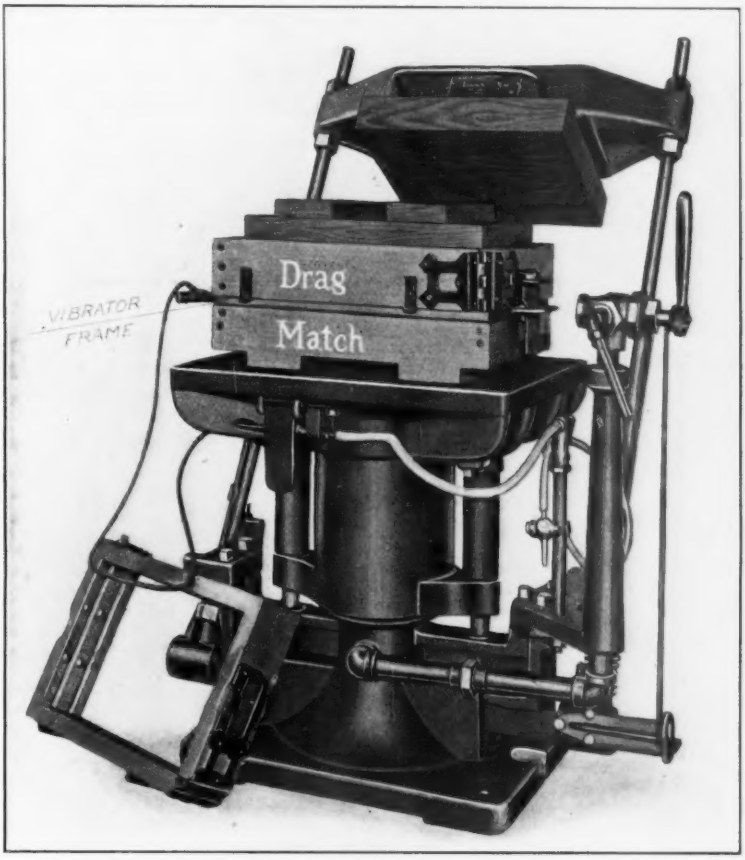
The Tabor Vibrator Frame Molding Machine.

At various times we have illustrated the Tabor molding machine, and we show on adjacent pages the latest development of this machine, the essential feature of which is the vibrator frame to which the patterns are attached.

The adaptability of this feature will be better understood when its great simplicity is known. Its economy lies in the ease with which an ordinary set of patterns may be placed on the machine without any extra cost.

Figure 1 shows the vibrator frame with a couple of patterns attached thereto. When the cope is ready to be removed, a valveless plunger in the vibrator plays backwards and forwards at a rapid rate, setting up a tremor in the frame and attached patterns, which frees the latter without any enlargement of the mold.

Figures 2 and 3 show the operations until the mold is finished, with which every foundryman is familiar. As soon as the complete mold is rammed up and the operator is ready to remove the cope, he presses with his knee a hinged pad placed within easy reach. This sets the vibrator in motion and the rapping and lifting occur simultaneously instead of one operation following the other as in hand work.



THE TABOR MOLDING MACHINE.

After the cope is removed and the operator is ready to draw the patterns, the vibrator is again set in motion, thus avoiding the use of the swab, draw plugs and the like. It is said that a great many patterns which have heretofore been molded on machines only with the aid of stripping plates can be used on this machine in the ordinary way.

The Tabor Mnfg. Co., Elizabeth, N. J., are the manufacturers.

Things are Changed.

BY P. LAWTON.

The other day I came across a mechanical paper issued about twelve years ago, which, among other things, contained a table showing the dimensions of ladles calculated to hold from thirty pounds upwards. The writer says that he makes all ladles up to two hundred pounds capacity of cast iron, and my recollection of lugging these cast iron affairs around causes me to give thanks for what improvement has taken place in the trade.

I know there are a lot of cast iron ladles in use to-day, yet I also know that every foundry that wants to make the work as easy as possible for their men have discarded them in favor of the stamped steel hand-ladle and the built up bull-ladle. This has not been done because the employers are philantropists, but because a man will do more work with a handy tool than he will with a clumsy one, and the average cast iron ladle is certainly entitled to the latter distinction.

THE TABOR VIBORATOR FRAME MOLDING MACHINE.

Even granting that the first cost of a cast iron ladle is low, their life is comparatively short. The continual heating and cooling to which they are subjected causes them to crack sooner or later. If our shop proprietors had to carry iron day after day the cast iron ladle would disappear altogether within three months.

Historical Sketch of the Crane Iron Works.

The interest of the public in the Crane Iron Works is not limited by their importance as an industrial establishment, nor by the measure of their influence in building up a thriving town, but extends to the broader field in which they are considered as the outgrowth of the first commercially successful attempt to manufacture iron by the use of anthracite coal in America. The story of this incalculably valuable manufacturing triumph and of the Crane Iron Works properly begins in the far off country of Wales, to which the world is indebted for a vast deal of its progress in the line of the sterner industrial arts.

David Thomas, who may be regarded as the father of the anthracite iron manufacture of America, was born in South Wales, November 3rd, 1794, and entered the iron business in 1812. After working in various places he went in 1817 to the Yniscedwin Works, Brecknockshire, located on the southern edge of an anthracite coal basin—the only one in the island of Great Britain. The Yniscedwin Works were the only blast furnaces erected on that bed of coal, the others being located where the coal was either bituminous or semi-bituminous. The works he was employed in were therefore more interested in the use of anthracite as fuel than those in other parts of the country, inasmuch as they had to bring their coke to be used in smelting iron from ten to fourteen miles by canal. As early as 1820, Mr. Thomas with George Crane, one-third owner of the Yniscedwin Works, began to experiment with anthracite, burning it in small proportions with coke, but not with practical success. In 1825 he had a small furnace built twenty-five feet high, with nine feet bosh, which was put in blast with coke and increased amounts of anthracite, but the experiments were not promising, and had to be abandoned. In 1830 the same furnace was made forty-five feet high with eleven feet bosh. Attempts were again made to discover the secret of success, and with better results than formerly, but still it was so unprofitable that the work was again abandoned.

During the time that Thomas and Crane were experimenting in Wales, similar attempts were being made in the United States with equal unsuccess. In the year 1825 Josiah White and Erskine Hazard, both of Philadelphia, being largely interested in the mining of anthracite coal in the then recently opened Lehigh basin, and having successfully used this coal in the manufacture of iron wire at their mill near the Falls of Schuylkill, erected a small furnace at Mauch Chunk, for the purpose of experimenting as to the practicability of smelting iron with this coal. Among other methods tried was that of passing the blast through a room heated as hot as possible with common iron stoves. They soon abandoned this furnace and erected a new one, in which they used charcoal exclusively, thus acknowledging their effort to have been a failure, though it contained the unrecognized suggestion of the true and afterwards successful method. In Wales, David Thomas was still toiling on persistently and patiently to discover the mystery. A key to unlock it was furnished in 1834 by Neilson, manager of the Glasgow Gas Works, who discovered the use of the hot blast. Its value was not immediately fully appreciated. The pamphlet on the hot blast, issued by Mr. Neilson, was read by David Thomas, who had been on the alert and had perused all of the treatises on iron manufacture and the combustion of anthracite which he could find. One evening while sitting with Mr. Crane in his library talking the matter over, he took the bellows and began to blow the anthracite fire in the grate. "You had better not, David," said Mr. Crane. "You will blow it out," and Thomas replied, "If we only had Neilson's hot blast here the anthracite would burn like pine." Mr. Crane said, "David, that is an idea." In fact it was the origin of the application of the hot blast in making iron with anthracite. In September, 1836, Thomas went to work, with Crane's consent, and built ovens for heating the blast. On February 5th, 1837, the new process was applied. The result was a success in a far greater degree than the two men had dared to hope after their many disappointments, and from that time on there was no difficulty in making iron with anthracite as fuel. The news of the success was spread over the kingdom.

In the great anthracite region of Pennsylvania, able and enterprising men were in readiness to utilize this valuable discovery. In 1838 the Lehigh Coal and Navigation Company had offered to any person who

would establish a furnace, lay out thirty thousand dollars, and run successfully on anthracite coal exclusively for three months, the valuable water privileges extending from the Hokendauqua to the Allentown dam. Under the inducement of this offer the Lehigh Crane Iron Company, consisting of the Coal and Navigation Company, was organized the same year, and in the fall of the year Mr. Erskine Hazard, one of the leading spirits of the company, went to Wales to engage some competent person to come to this country in their interest, and to superintend the erection of furnaces. He went to Mr. Crane, who recommended David Thomas. Together they went to see him. At first he was reluctant to leave his native land, but at last, influenced by a liberal offer and the consideration that his sons would have better opportunities in America than they could hope for in Wales or Great Britain, he consented, and upon the night of the last day in the year, concluded an agreement. Mr. Thomas sailed for this country from Liverpool in May, 1839, on the clipper "Roscius," which made the then unprecedented run of twenty-three days, reaching New York June 5th, and brought with him his whole family —his wife and five children. Before leaving England he had had the blowing machinery and castings for the hot blast made, and all were shipped except the two cylinders, which were too large for the hatches of the ship. So when the other machinery arrived the projectors of the works were as badly off as if none had been sent. There was not at that time a foundry in the United States large enough to cast such cylinders as were needed. There were small ones at Allentown and Bethlehem. The company applied to the Allaire Works of New York, and the Alger of Boston, but neither of them could bore a five-foot cylinder without enlarging their works, which they were unwilling to do. Mr. Thomas then went to Philadelphia to the Southwark foundry of S. V. Merrick and J. H. Towne, who enlarged their boring machinery and made the five-foot cylinders required. Fire brick were imported from Wales, there then being none manufactured in this country, and in August, 1839, ground was broken at Craneville (now Catasauqua) for the first furnace. After many difficulties and discouragements, the furnace was finally blown in at 5 o'clock, July 3d, 1840. The ore was two-thirds hematite to one-third New Jersey magnetic. It was blown with two and a half inch nozzles, and the blast heat was six hundred degrees. The first run of iron was made the fourth of July, and proved a great success. From this time on the manufacture of iron by anthracite was successfully conducted at the Crane Works, and continuously except for the slight cessations common to all manufacturing establishments. Furnace No. 1 in which the success of the new discovery was fully demonstrated in this country, was forty-two feet in height, with twelve feet bosh. It was operated by a breast wheel twelve feet in diameter and twenty-four feet long, geared by segments on its circumference to a spur wheel on a double crank, driving two blowing cylinders, five feet in diameter, with a six-foot stroke, worked by beams on a gallows frame. The motive power was the water of the canal—the difference between the upper and lower levels of Lock No. 36. The furnace remained in blast until its fires were quenched by the rising waters of the great flood of January, 1841, a period of six months, during which one thousand and eighty tons of pig iron were produced. The largest output for one week was fifty-two tons.

Furnace No. 1 was blown in again after the freshet, May 18th, 1841, and then remained in blast until August 6th, 1842, producing three thousand, three hundred and sixteen tons of pig iron.

A very chorus of the "I told you so," always unpleasant even as a solo, would have been heard by Mr. Thomas and the members of the Crane Company had they met with failure in their undertaking. Mr. Thomas had been very generally looked upon as a visionary. The remark made by a leading charcoal iron master, "I will eat all the iron you make with anthracite," gave expression to the general sentiment of the trade at that time. It is needless to say that he did not keep his promise, although Mr. Thomas sent him word that he had a hearty dinner ready for him, cooked in the company's first furnace.

From that time forward the works have been in continued and successful operation and "Crane" iron has retained the enviable reputation which it speedily gained throughout the Eastern and Middle States.

The Cupola Practice in Bessemer Steel Works.

BY S. M. RODGERS.

There is no essential difference in the construction of the cupola used in the Bessemer Steel Works and the cupola used in ordinary foundry practice. But the circumstances and conditions governing the proper manipulation of the former, from those of the latter, may be worthy of some consideration. In order that every detail of the discussion shall be better understood, the following drawing is appended.

The thickness of the lining from the bottom of the bosh to some distance above the tuyeres being about 24 to 26 inches is quite essential when a cupola is to be continuously operated for a whole week. Even this thickness is insufficient when the cupola is not started properly; or when the iron is high in manganese the lining is rapidly reduced. The cupola is lined with the best quality of bricks, and all necessary repairs are made with any good grade of stone, using a mixture of five parts of ganister to one of clay.

The tuyeres in the Bessemer cupola are placed much higher above the bottom of the bosh than in the ordinary foundry cupola, the reason being quite apparent since there must be considerable space below the tuyeres to be used as a reservoir for the melted iron. The shape of the tuyeres seems to have little bearing on the consumption of fuel or rapidity of melting, so long as the proper volume of air is entering the cupola in such a manner as to cause complete combustion of all the fuel within or as near to the melting zone as possible.

The number of tuyeres depends upon the size and kind of cupola. The cupola herein described contains about 48 or 50 tuyeres, having a diameter of four inches on the outside, tapering to two and one-half on the inside.

The size and number of tuyeres seem to be largely matters of choice. However, it seems quite reasonable that the smaller the tuyeres, the more apt they are to be rendered useless by the fuel closing their inlets. Also the smaller they are the less the general distribution of the air, and the greater and more rapid are the fluctuations of the melting zone. The shape of the tuyeres does not seem to materially influence the melting capacity of the cupola, but their position may increase or decrease the depth of the melting zone.

The tuyere area should be at least two and a half times (2½) as great as the air conductors, and each conductor should be provided with a volume gauge in order that the melter may know that each cupola is receiving the proper volume of air for complete combustion of all the fuel. A change in the volume of blast entering a cupola, sometimes arising from the temporary closing of some of the tuyeres with fuel, must necessarily give rise to considerable fluctuation of the melting zone and thereby cause irregular melting.

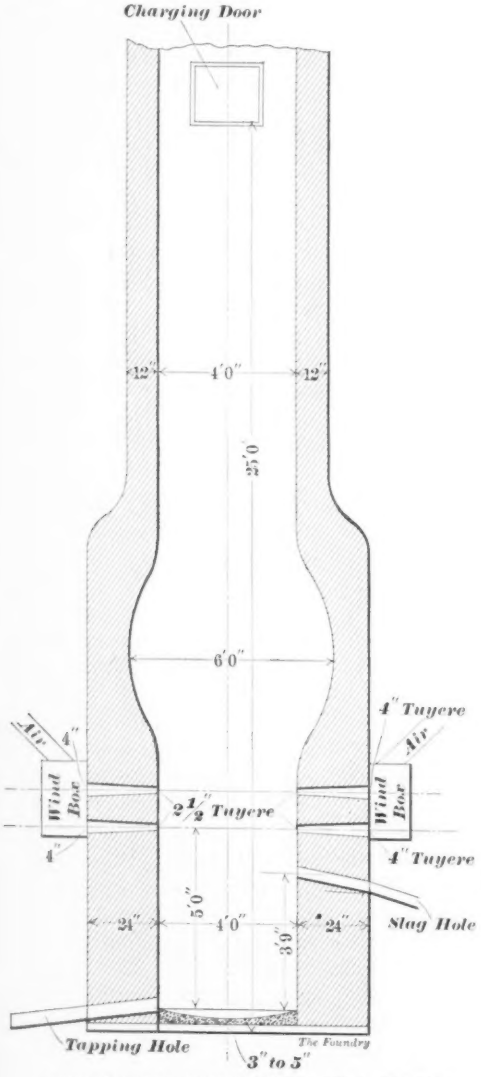
When more than one cupola is being operated at the same time, and each receiving its supply of air from the same main, it is difficult to determine whether each is receiving its pro-rata of blast, unless each air conductor is provided with a volume gauge. The pressure gauge may show the required pressure, but it is in no sense a measure of volume. The absence of some practical means of measuring the volume of air passing into a cupola is a very serious difficulty in the way of scientific and economic melting.

Practical demonstration shows that, under favorable conditions, it requires about thirty thousand (30,000) cubic feet of air or about twenty-four hundred (2,400) pounds to melt one ton of iron. When we realize what a large amount of moisture this volume of air may contain on a damp or rainy day, in addition to the quantity the fuel may contain when it is exposed to the weather, then we may more readily understand how seriously the operations of a cupola may be effected, and how readily a change in the burden may be required.

It would no doubt be surprising if we could accurately estimate the weight of water that enters a cupola under the above conditions, and the increase in the consumption of fuel caused thereby. It is also important to note that the more water the air contains the greater will be its oxidizing effect upon the iron, since eight-ninths (8-9) of its weight are oxygen, while in dry air a little less than two-eighths (2-8) are oxygen, it follows that the more moisture the air contains, the greater will be its oxidizing effect upon the iron. However, the cooling action of the watery vapor has a tendency to counteract its oxidizing effect, but much heat is absorbed by its decomposition.

When the proper quantity of air is supplied

the combustion is perfect, and carbonic acid gas (CO_2) is the result. When the quantity of air is insufficient the combustion is imperfect and carbonic oxide (CO) is the result. The quantity of heat evolved in the two cases is as fifteen (15) to four and a half (4½), showing a loss of more than two-thirds (⅔) of the heat by imperfect combustion.



CUPOLA FOR BESSEMER STEEL WORKS.

The loss of fuel is not all. Much iron may be lost by the oxidizing influence of the blast, a large amount of which is mechanically carried out of the cupola when the pressure of the blast is high, and part is lost through the slag hole. It is not always true that we obtain the most rapid melting when we are forcing into the cupola the largest volume of air. Some time is required to elevate the temperature of the air to the point that it will enter into combustion with the fuel.

Any more air than is required for complete combustion of all the fuel, rapidly absorbs heat, reduces the temperature, retards combustion and the fire in the cupola may be entirely extinguished. When the blast pressure is high much of the fuel is consumed long before it reaches the melting zone.

The cupola cannot produce molten iron in the proper condition neither chemically nor physically when the air pressure is too high and the volume too small. But with a pressure of from four (4) to seven (7) ounces per square inch, and a sufficiently large volume to produce rapid combustion of all the fuel, with the absence of all excessive tendencies to oxidizing influences in the melting zone, the very best results may be expected.

The melting zone is not the only place where iron may sustain injury and loss. The careless manner of tapping the slag often results in exposing the molten iron to the oxidizing influence of the blast, which is always greater under high pressure than low, as well as to cause the absorption of oxygen and other gases, and thereby render the iron wholly unfit for certain castings.

At first we might think that carbon and phosphorus protect iron from oxidation, but in their peculiar chemical combinations in molten iron, they greatly increase the tendency to burn. Burning, however, does not seem to be oxidation, but rather the result of structural change, not necessarily dependent on oxidation, though possibly favored by it. Another condition which is sometimes fraught with serious consequences is the foaming of the slag, which is usually caused by too much blast.

We now come to the question of flux, which is quite important and deserving of the most careful attention of the melter. Limestone is almost universally used, and in the Bessemer practice usually requires from thirty-five (35) to forty (40) pounds per ton of metal. But the character and composition of the iron to be melted and the kind of fuel used must control the quantity of flux to be added with each charge.

Iron containing one per cent. of manganese or more, causes rapid action on the cupola lining, thereby increasing the amount of material to be slagged off, at the same time

rendering the slag quite liquid. The plastic condition of the slag causing great difficulty in tapping, is the result of too little fluxing material. However, the proper use of limestone demands the exercise of considerable judgment, since too much as also too little produces a whiter, weaker and harder metal than when the proper amount is added. This is no doubt due to the de-siliconizing tendency of a strong blast with an excessive amount of fuel, supplemented by the absorption of sulphur from both fuel and flux.

Iron may also be seriously effected by the imperfectly fused state of the slag descending more or less mixed with the melted iron. In the Bessemer practice such a condition is not apt to effect the resulting steel.

In the Bessemer practice we must not forget that there are many circumstances and conditions which largely influence the proper management of the cupola, and that many of the difficulties are entirely unavoidable. To manipulate the cupola successfully means that all the parts of the plant must be in successful operation with as few delays as possible. However, it frequently happens that when the cupolas are in successful operation, that an accident to some part of the machinery may make it necessary to stop the blast, discontinue charging and retain the molten iron in the cupola till the damage is repaired. Should such a delay extend beyond six or eight hours, the contents of the cupola must be dropped, which means considerable loss of time and material.

Then again, there are difficulties entirely local and not dependent upon the operation of other parts of the plant, such as a delay in the first appearance of iron at the tap hole, caused by too much fuel being added previous to the first charge of iron, thus causing the latter to remain above the melting zone till the excess of fuel has been consumed. Also any considerable variation in the pressure and volume of air will change the melting capacity, as well as the temperature of the melted iron. Now, in conclusion let me say that, while it is encouraging to note that within the past few years the application of science to the foundry practice has made rapid progress, yet the proper distribution of that science to each and every department of the foundry is sadly wanting. There is no doubt that if the cupola practice and the materials used therein were given the same careful and scientific consideration that our machine shops receive, the economic results would be astonishing.

In 1873 an eminent English authority stated. "If we could avoid the future of what may be designated unscientific practice, or the failure of impracticable science, we must seek to combine commercial intelligence with a knowledge of those laws which form the only trustworthy groundwork of the complicated processes in which we are engaged." Each day brings us nearer to the fact that the day has come when much time should be devoted to securing a more thorough acquaintance with scientific and metallurgical principles, and incorporate into the foundry practice as many well established facts as possible, remembering that applied science is but the application of pure science to particular classes of problems, while pure science consists in deducing general principles by reason and observation.

Plain Tales from the Brass Foundry.

BY K. K.

Once upon a time there was a molder, who had served a long apprenticeship to his trade, had worked at it many years and studied it so he was, of course, a first-class man. He had for a great many years worked in a shop where he was considered the whole thing, and, as sometimes happens in such cases, his head had become a trifle enlarged. He did what he considered right and proper for a day's work, and there was no kicking, for the foreman knew he would not stand for it, and he was really a very valuable man on the class of work which the firm handled, which was all of a heavy character.

But life to us mortals is full of change, and this molder was no exception. He quit, went to another city, told them what he could do, got work, and the firm soon found out that he was as he had represented himself to be, but he was slow; this was something that the molder never realized, then. He was doing as well as he ever had, probably better, but somehow or other he found himself loafing about one-half of his time; he was continually getting "laid off," and the reason was that when his especial class of work had run out for the time being, the firm really wishing to keep him, would put him on "gated" and light work generally.

Fully appreciating his own value on heavy jobbing, this molder was not going to rush

things any. He laughed at the other fellows, putting up so many flasks. He was not going to do it; and he did not, with the result, that the firm found it paid them better to lay him off, and take chances on being able to wiggle along in the old way if Mr. Jobber did not show up when they had something for him again in his line.

The molder never "tumbled," although he thought it singular that men who were as mechanics so much his inferiors should stand such a better show of steady work. Little by little, however, light dawned on his mind, and he came at last to wonder why he could not do as well as the other men on that swift work. He studied the thing up, and here are the results of his observations, as he told them to the writer. "When I first tackled this class of work," he said, "I went at it the same as I would with jobbing: After arranging my half flask over the patterns I would sieve on some sand, carefully rubbing through every particle possible, then shovel in a little more and tuck it over the patterns with my fingers, then fill in sand level with the top of flask, and start to peene, using only one rammer. I would go around the sides then, then across several times. The peening completed, I would have to drop my rammer to shovel on more sand, then butt-ram, strike off and bed on my board.

"Now, it took only a little study to show me I was going through a whole lot of unnecessary movements, with the result that I was falling considerably short of a day's work, and yet was working as hard as those who were living up to requirements.

"It so happened that at the time of my awakening I got a job in a shop where I had not previously worked, but where I was well known by reputation. For two or three weeks I ran along on heavy jobbing work as usual, but one day the foreman gave me one of the jobs that I was anxious to tackle. It was a plain gated affair, a sort of a cup. The gate was so made that the cups were molded bottom upwards, the green sand core being in the nowel. The whole battle consisted in getting a clean 'lift' when taking off the cope. This would have been comparatively easy, but the foreman was something of a crank, and would not permit of the practice of 'rapping' because it took another molder from his work and caused loss of time in waiting; so if a molder could not get off his cope without a rap, he had very little use for him. The other molders being old hands, had got used to this little peculiarity, and got along credibly without the rap, but trouble came to me that first morning. I couldn't get a clean lift, and shook out cope after cope. Thirty of these molds was a day's work, and I began to see my finish, when the idea came to me to rap with my knee. I tried it, found it very difficult at first, but with persistent practice found I could do it all right, and shaking out of copes became less frequent, and progress consequently more rapid, and in a day or so I got up those thirty molds with an ease that surprised not only the foreman but all the shop, who I not unjustly suspected of laughing in their sleeves at my trouble of the first morning. On this class of work I found I could reduce the number of movements necessary to finish the mold to such an extent that that part of the work became a mere trifle.

"Before taking off the cope I cut and reamed out the sprues (there were two of them), and after lifting it off rapped the patterns and carefully removed all loose sand with the bellows, then drew the patern. If any particles of sand fell either into the molds, runner or gates, I would pick them out with a moistened tool. I never used the bellows after the patterns were removed, as I did not 'try' on my cope, and any loose sand would have been blown away or into the molds, thus causing lots of trouble and more delay than if I had adopted the usual plan of first lifting the cope, then cutting the sprues, trying on the cope and reaming out the heads of sprues, so I just used care to see there was no loose sand in the path of the metal, then dusted on a little flour and closed my mold.

"The foreman did not approve of this procedure, and carefully inspected the castings after each heat, but could find no fault. This method, however, cannot be used on all classes of gated work, as on some the use of the bellows is indispensable to the production of clean work. In such cases the usual method of finishing the mold is preferable. So when I got a gate of this description I studied to reduce the movements necessary in ramming the mold, to the minimum.

"Instead of using only one rammer, I began to use two—one in each hand. I found, however, that the manner in which the sand is shoveled into the flask was the most im-

portant factor in saving time. When on jobbing work, I proceeded to ram as outlined above, but in the new method I adopted I would sieve in sufficient sand, throw the leavings out of the sieve, put a large shovelful of sand into the flask, filling it loosely, go over it rapidly with the fingers, pile on two more shovels of sand, peene it around the sides using the two rammers, then, holding the rammers like dumb-bells, I would pound the sand level, which would leave it so compact that on going over it lightly with the butt it would be properly rammed. I would then use the strike in such a manner that it would leave sufficient sand behind to permit of the board being bedded on. It was surprising how much time was saved by this method of ramming, and I afterwards observed that the most rapid molders were the ones who had reduced the movements of ramming to the lowest possible point."

Perhaps some people may consider that this story needs an apology, as it deals altogether too much with swiftness, while they may not approve of that way of working. To such I will say, that I hope they will never have to depart from the easy jog of the jobbing molder, who has got a snap; but they must consider that all of their brothers are not so comfortably situated, that some may find it necessary to hustle in order to obtain comparatively steady work, and that these less fortunate beings may possibly find in these few remarks something to interest them, even as the writer was interested.

Fire Clay.*

Refractory material may be divided into three classes: 1, acid refractory materials, including clay, of which silica fire brick are made, the material in this case being silicate of alumina; 2, neutral or chrome or red brick, of which the main ingredient is chromate of iron; 3, basic refractory material or magnesite, of which the main ingredient is carbonate of magnesia.

In order to explain the existence of these different materials it will be necessary to go a little into geology. In early geological times clay resulted from the decomposition of granite and was composed of quartz, feldspar and mica. The clay gradually decomposed and the mica was washed away. Later on the quartz was washed away also, and the feldspar which was left became soft and constitutes what is now called kaoline. Primary clays all have more or less mica and quartz still mixed in them. When the clay has been thoroughly washed in this manner it is mainly pure, but the clays as found are of widely varying grades of purity. There is also a variety of clay which has been formed from the decomposition of sandstone, and this clay contains grit. Another variety is formed from resolved limestone. This is found in the pot holes of Kentucky, the bed being usually composed of a limestone containing about one-third clay and two-thirds carbonate of lime. This clay is not good as a refractory material, but is excellent for pottery work. In our work we want one little corner in this classification of clay—the best. The qualities to be considered in selecting a refractory material for foundry work are shrinkage, plasticity, corrodibility and liability to abrasion, while the composition must also be taken into account. Some varieties of brick expand in use, while others shrink, and the best brick would be one that combines these two qualities in equal proportions, so that it would remain unaltered in use. One way to reduce the shrinkage is to add to the clay mixture ground burnt brick, which has, of course, already gone through the shrinking process. The fineness of the grain of the brick has a great deal to do with its ability to resist corrosion. Again it is suggested that in lining the cupola it would be well to use different kinds of brick at different heights. The glazed brick will resist abrasion or wearing away the best of all, but this brick is very likely to spawl off, and on that account cannot be used.

There is a wide range in the composition of different clays, the finest variety being that which is used in crucible steel making and the poorest being the common red brick, although the adobe of which many houses in Mexico are built might also be included and would come below the red variety. This adobe is composed of 50 per cent lime and 50 per cent clay. In refractory brick for metallurgical purposes it is necessary that the impurities shall not exceed 5 per cent, the most important of these impurities being lime, magnesia and soda. In pottery clay there is between 2 and 3 per cent of lime. This

*From an address by Richard Moldenke before the Pittsburg Foundrymen's Association.

alone would unfit it for use as a refractory material. In the red clay there is sometimes 7 per cent of iron, and chemists are frequently called upon to assay this red clay by parties who think they have found commercial deposits of iron ore.

In examining clay to determine its adaptability as a refractory material the physical property should first be investigated. The color should be noticed. A sample should be powdered and the manner in which it calcines noted. The fracture should then be examined whether smooth or rough, etc. Then the texture should be noted. Next the specific gravity should be determined, the dense clays having a specific gravity of over 2, while the lighter clays have a specific gravity even under 1.75. It is well to consider these matters, as in some cases it is possible to mix some of the lighter clay in with the heavier and still obtain a sufficiently high specific gravity. Next it is well to slack the sample by putting it in water and noting how fast it is acted upon. The size of the grains coming off should also be watched and the water should be felt to determine whether there is any grit present.

In examining for plasticity a sample is put into water, which makes it plastic. The quantity of water required to produce plasticity should be observed. The sample exhibited required only 31 per cent of water to make it plastic, which is very satisfactory. The less water required the better, because all this water which is put in the clay to make it plastic must come out of it ultimately, and this produces shrinkage. The strength of the clay under pressure should next be noted. The sample exhibited withstood a pressure of 150 pounds per the square inch. Some clays will only stand 30 or 40 pounds to the square inch. The shrinkage in the brick should be noted in two stages: first, the air shrinkage, by drying the brick in air, which amounted to 9 per cent in the case of the Klingenburg clay, and then the shrinkage by slowly calcining, which amounted with the Klingenburg clay to 7 per cent, making a total shrinkage of 16 per cent.

In examining into the vitrifying qualities, the sample should be heated to a temperature as high as possible and very slowly. The highest temperature which the speaker had been able to secure was 2,700° F. This had been secured by using a muffle with natural gas and hot air at 2,700° F. The Klingenburg material showed the edges slightly rounded. Besides noting the tendency of the edges to become round, a piece should be supported at the ends and the amount of sag in the center should be observed. A sample of Kentucky brick sagged considerably under such treatment and the edges became very round. For annealing furnaces the amount of heat which the brick will stand is not of nearly as much importance as in steel melting, and by observing this point it is sometimes possible to save $4 a thousand in the cost of the brick. There is also what is called a "rational analysis," where an investigation is made to see how pure the clay is, an examination being made for mica, etc.

The American Bridge Co.

The American Bridge Company have issued the following circular letter to the trade:

"As a result of numerous conferences it has been deemed expedient to organize the American Bridge Company, incorporated for the purpose of designing, building and erecting bridges and all classes of metallic structures. The facilities at our disposal are such that we have every confidence that we shall be able to give you the advantage of very favorable quotations and at the same time be enabled to avoid delays in delivery which in the past have proved so vexatious in many instances. We solicit your inquiries, which shall have our very best attention."

Accompanying this is a list of the various bridge companies forming the consolidation, as follows: American Bridge Works, Chicago, Ill.; Berlin Iron Bridge Co., East Berlin, Conn.; Buffalo Bridge & Iron Works, Buffalo, N. Y.; Carnegie Steel Co. (Keystone plant), Pittsburg, Pa.; Edge Moor Bridge Works, Wilmington, Del.; Elmira Bridge Co., Elmira, N. Y.; Gillette-Herzog Mfg. Co., Minneapolis, Minn.; Groton Bridge & Mfg. Co., Groton, N. Y.; Hilton Bridge Construction Co., Albany, N. Y.; Horseheads Bridge Co., Horseheads, N. Y.; Lafeyette Bridge Co., Lafayette, Ind.; Lassig Bridge & Iron Works, Chicago, Ill.; N. J. Steel & Iron Co., Trenton, N. J.; New Columbus Bridge Co., Columbus, Ohio; Pittsburg Bridge Co., Pittsburg, Pa.; A. & P. Roberts Co. (Pencoyd Iron Works), Pencoyd, Pa.; Post & McCord, Brooklyn, N.

Y.; Rochester Bridge & Iron Wks., Rochester, N. Y.; Schultz Bridge & Iron Wks., Pittsburg, Pa.; Union Bridge Co., Athens, Pa.; Milwaukee Bridge Co., Milwaukee, Wis.; Wrought Iron Bridge Co., Canton, Ohio; Youngstown Bridge Co., Youngstown, Ohio.

This list contains the leading companies that manufacture bridge and structural work in this country, with the combined capacity of 600,000 tons per annum. The Pencoyd plant, of the A. & P. Roberts Company, also comprises one of the best and most complete rolling mills for structural material in existence, with a capacity of 200,000 tons per annum. This puts the American Bridge Company in a position to furnish all classes of bridge and structural work at an absolute minimum of cost, and in the very shortest possible time, and this has already been announced as the future policy of the company. No advance in prices will be made, but the cost of production will be reduced to an absolute minimum, and judging from the known facilities of the various plants, the facts would seem to justify the statement.

The executive organization is made up entirely of men of large practical experience, headed by Percival Roberts, Jr., one of the leading rolling mill managers of the country. The Pencoyd plant of the A. & P. Roberts Company, comprising a rolling mill with a capacity of 200,000 tons per annum and the most complete bridge and structural plant in the world, has all been developed under his personal supervision, and is the result of his energy and ability—eminently fitting him to head an enterprise of this kind.

Joshua A. Hatfield has been appointed as assistant to the president, and will also have charge of the sales of the rolling mill products of the Pencoyd plant—a position which his long and favorable connection with the sales department of the rolling mill interests of the country makes him especially adapted.

The engineering department is in charge of Mr. Charles C. Schneider, formerly chief engineer of the Pencoyd Iron Works, of the A. & P. Roberts Company, with the title of vice-president, in charge of engineering. Mr. Schneider has full charge of all questions of engineering, including the preparation of all plans, estimates and working drawings—all engineers of the company, whether engaged in the contracting, operating or erecting departments, are under the vice-president in charge of engineering. At different localities throughout the country are stationed a corps of designing engineers to prepare preliminary plans and estimates, and at each plant will be located a full and complete corps of engineers and draughtsmen to prepare plans for the work fabricated at that particular plant.

The operating department is in charge of Mr. Charles M. Jarvis, formerly president of the Berlin Iron Bridge Company, with the title of vice-president in charge of operating. As soon as contracts for any work are taken, they are immediately turned over to this department for execution, and consequently all the plants and erecting forces of the company belong in this department. At each plant is a manager, with full charge over all employes and the operations of that particular plant. Where a number of plants are closely located, they are placed under one local manager, each plant being equipped with a superintendent. All managers are under the direct charge of a general manager, Mr. James P. Kennedy, formerly president of the Youngstown Bridge Company, who moves about among the various plants in order to see that all are working in one harmonious whole, and that each has the advantage of the experience of every other plant. The erecting is also in charge of the operating department, and this is under Mr. William Wennas, as superintendent. Mr. Wennas has had full charge of all the Pencoyd erecting for a number of years, and gained a world-wide reputation but a short time ago for the economical and expeditious manner in which he handled the erection of the famous Atbara bridge.

All the sales of the Company are in charge of the contracting department. The railway contracting is in charge of Mr. Charles Macdonald, formerly president of the Union Bridge Company. The highway contracting is in charge of Mr. Frank Conger, formerly president of the Groton Bridge & Manufacturing Company, and the structural contracting is in charge of Mr. W. H. McCord, formerly of the Post & McCord Company. The preparation of all proposals and contracts is in charge of this department. The company have opened contracting offices in different parts of the country, each office reporting daily, by wire, to various members of the contracting department. The contracting department of the American Bridge Company is one of the most important, as here

are made up the proposals and estimates on all work, and it might almost be said that on the careful judgment and management of the members of this department depends chiefly the success of the company.

The mechanical department has been made of equal importance with all other departments, and has been placed in charge of Mr. James Christie, formerly mechanical engineer of the Pencoyd plant, with the title of vice-president. The mechanical details of all the various plants belong to this department, and the selection of Mr. Christie as the head insures the American Bridge Company of mechanical equipment that will guarantee the production of a pound of finished bridge material at the absolute minimum expenditure of power.

Among the Foundries.

W. Winterhalter will start a foundry at Bad Axe, Mich.

Hildreth & Co. will erect a new foundry at Lansing, Mich.

C. Oscar Tracy has established a brass foundry at Norwich, Conn.

The Pennsylvania Steel Co. is erecting a new foundry at Steelton, Pa.

The J. F. Powers Foundry Co. will build a new foundry at Elkton, Md.

The Snead Iron Co. have nearly completed their plant at Jersey City, N. J.

Sprout, Waldron & Co., Muncy, Pa., are enlarging the capacity of their foundry.

The Simpson Iron Co., of Columbus, Ohio, have broken ground for a new foundry.

The South Florida Foundry and Machine Works at Orlando, Fla., will extend their foundry.

The National Foundry Co., of Brooklyn, N. Y., are making extensive improvements in their plant.

The Pusey & Jones Co., of Wilmington, Del., contemplates the building of an addition to its foundry.

The A. J. Lindeman & Hoverson Co., of Milwaukee, Wis., is having plans prepared for a large foundry.

The Pratt & Whitney Co., of Hartford, Conn., has passed under the control of the Niles-Bement-Pond Co.

The Scandia Foundry Co. has been incorporated at Chicago by John Rosenberg, C. F. Larson, and G. F. Rosenlof.

The Columbia Mnfg. Co. has been formed at Benton Harbor, Mich., by A. A. Besson, C. M. Converse and S. A. Bailey.

P. H. Touhey, of Lockport, ex-sheriff of Niagara County, has opened an iron and brass foundry at Niagara Falls, N. Y.

The Union Rolling Mill & Foundry Co. has been incorporated at Denver, Colo., by W. P. Harris, C. D. Holmes and E. P. Butler.

Chas. McAvoy and James Wiley have purchased the Benj. McKillen foundry at Bad Axe, Mich., and will continue the business.

The Sioux City (Ia.) Foundry and Manufacturing Co. has doubled its capacity by adding to its plant a new foundry 25 by 100 feet.

The Kidder Press Mfg. Co., of Boston, has purchased the plant of the Somersworth Machine Co. at Dover, N. H., and will locate there.

The Tampa Foundry & Machine Co. has been organized at Tampa, Fla., by S. L. Varnadoe, P. O. Knight, John T. Moffitt and W. C. Thomas.

The Beaver Dam Malleable Iron Works, of Beaver Dam, Wis., which was completely destroyed by fire May 1st last, is again ready for operation with increased capacity.

The plant at Mansfield, Ohio, formerly occupied by the Fulton Truck and Foundry Co., has been purchased by parties who will incorporate under the name of the Century Mfg. Co.

The plant of the Shetter Foundry and Machine Co. at New Cumberland, W. Va., has been leased by the Means Foundry and Machine Co., of Steubenville, Ohio, and will be put into operation at once.

The Elmira Heights Foundry and Machine Company has been incorporated with a capital stock of $10,000. The directors are Harry M. Beardsley and H. H. Hallock, of Elmira, N. Y., and John McGregory, Elmira Heights.

The Lappin Brake Shoe Co., of Bloomfield, N. J., have lately completed a new addition to its works. The foundry is provided with a fine wash room, toilet rooms and shower baths. A lunch room has also been set aside for the workmen.

The Peerless Foundry Company, of Indianapolis, Ind., has been incorporated with a capital stock of $4,500. The company will manufacture and repair stoves, etc. The directors are August A. Hellstern, William G. Williams and Griffith W. Williams.

The Crown Casting Company, Marietta, O., have been incorporated with a capital stock of $50,000. The incorporators of the new company are N. L. Williams, Willis Morris,

O. A. Lambert and others. The new company will manufacture soil pipe and supplies.

George B. West, who lately purchased the foundry business of W. H. Pelkey, at Fairhaven, Vt., has organized a stock company to be known as the Fairhaven Foundry & Machine Co. Morris Patterson is president of the new company and Mr. West treasurer and manager.

The Globe Foundry & Construction Company, of Pittsburg, has been organized and will apply for a charter. This company is composed of the owners of the Globe Plow Works and the purpose is to organize a stock concern. The incorporators are Joseph T. and W. W. Speer, Jr., David G. and D. P. Justice.

John S. Clark, who several years ago had charge of the foundry work of the Rio Grande Road at Burnham, but who six years ago went to Grand Junction, Colo., returned to Denver, Colo., and purchased a large piece of real estate on South Seventh street, between West Thirteenth and Fourteenth avenues, upon which he will immediately erect an extensive iron foundry which will be devoted exclusively to making mine and smelter supplies and heavy castings. The plant will cost about $50,000 and will employ thirty iron molders.

The Ryther & Pringle Manufacturing Co., recently incorporated, has purchased the foundry and machine business of Ryther & Pringle, in Carthage, N. Y. The formation of the new company was necessary to close up the estate of the late Charles P. Ryther. At the election of officers James Pringle was elected president, George D. Ryther, vice-president, and Fred W. Coburn, secretary and treasurer. Geo. Ryther will be general superintendent of the new concern. The company will engage in the manufacture of pulp and paper mill machinery and also do general job work.

The Clymer Mnfg. Co., of Indiana, Pa., write us as follows: We have purchased the foundry property of Major Irvin McFarland, deceased. Have thoroughly repaired and refitted the establishment, and are better prepared to do a general foundry business than any of our predecessors. We are the successors of a long line of foundrymen, viz: John Shryock, James Bailey, Burns, Convery & Co., Burns & Turner, Indiana Mnfg. Co., McFarland & Turner, I. McFarland, Smith & McCartney and A. L. Smith. We have the patterns for the goods and wares manufactured by these firms of the past and can furnish repairs for stoves, plows and machinery, etc., made by them. We will continue the manufacture of such lines of stoves, etc., as suit the trade of to-day and add new ones from time to time.

Within the past month the Stockham Mfg. Co., Grand ave. and N. 46th ave., Chicago, has started up its malleable castings plant, which eventually will be one of the most complete of its kind in the country. The main building, housing the malleable molding room and the two air furnaces, is of brick, 100x300 feet, and is equipped with a traveling crane. A second building, of iron construction and iron roof, 180x140 feet in size, contains the annealing furnaces. The malleable plant has a capacity of from 30 to 40 tons of castings a day. The gray iron foundry, across the railroad tracks from the malleable plant, employs 200 men in the manufacture of light castings, and is in a building with about 40,000 square feet of floor space, which is equipped with a jib crane, a Colliau cupola of eight tons capacity and a Whiting cupola of 15 tons capacity. This foundry has a capacity of over 18 tons of light castings a day. The plant also includes a brass foundry, a pattern shop employing 15 hands, a machine shop for finishing castings and for doing the company's repair work employing 15 men, and a polishing and plating room with a capacity of three tons of work a day. The entire plant employs electric distribution of power, and is very favorably located, being on the Belt Railway, the C. & N. W., and the C. M. & St. P. roads. The gray iron plant has been running for some years, but the malleable foundry has just been started up, and is not yet complete. Further work is to be done on it, and it is hardly expected it will be finally completed for several months. The company has been doing a very good business, both in malleables and gray iron, and has lately taken considerable export orders for the former, including some for shipment to South Africa. The officers of the company are William H. Stockham, president; S. T. Nicholson, vice-president, and W. S. Burling, secretary.

The Keystone Car Wheel Company has been formed, with a capital of $200,000, and plans have been prepared for a plant with a primary capacity of from 300 to 350 car

wheels a day, but with provisions for an eventual capacity of 600 wheels daily. The company has already purchased a site of ten acres near Homestead, Pa., for $60,000, and material for the plant is already on the ground. The organizers and directors of the company are Charles V. Slocum, formerly Treasurer and Manager of the Pennsylvania Car Wheel Company; William L. Elkins, Assistant Treasurer of the Consolidated Traction Company, Pittsburg; William W. Lobdell, President of the Lobdell Car Wheel Company, of Wilmington, Del.; Louis B. Whitney, formerly of A. Whitney & Sons, of Philadelphia, the oldest car wheel manufacturers in the United States; Charles A. Otis, Jr., of Otis, Hough & Co., iron and steel merchants of Cleveland, and son of the former President of the Otis Steel Company. Charles V. Slocum, the organizer of the company, will be general manager. He has already had remarkable success in the car wheel business. When he was 25 years old he was business manager for Frederick Stearns & Co., one of the largest manufacturing establishments of Detroit. He went later to the New York Car Wheel Company, of Buffalo, where he was for several years treasurer. He left this company to come to Pittsburg to organize the Pennsylvania Car Wheel Company, of Allegheny, in January, 1898. He became treasurer and manager, the plant had a capacity of 600 wheels a day, and the success of the venture is well known. Mr. Slocum has several times appeared before the Pittsburg Foundrymen's Association on car wheel topics. Last November J. W. Rhodes and his associates, among the largest stockholders of the Pennsylvania Car Wheel Company, sold their stock to the Schoens, of the Pressed Steel Car Company, and Mr. Slocum disposed of his interest at that time.

Deaths.

H. B. Smith expired July 1st, aged 83. He was the founder of the H. B. Smith Co. at Westfield, Mass.

Edward H. Smith, at one time a well-known foundry foreman, died in Manchester, N. H., recently, aged 74.

W. B. Crittenden, at one time manager of the Bucyrus Co., now located at South Milwaukee, Wis., died at his home in Brooklyn, N. Y., recently, aged 45.

Fires.

The Marlboro (Mass.) Foundry Co. had their plant burned June 26.

The foundry and machine shop of the Sadie-Claire Co., Talladega, Ala., was burned June 22.

J. T. Carmody, of Cedar Rapids, Iowa, suffered the loss of a large number of patterns in a recent fire.

The foundry of the W. F. McCrae Foundry Co. at McKeesport, Pa., burned June 23. It had only been in operation a short time.

The Auburn (Me.) Stove Foundry was destroyed by fire recently. As the company recently went into insolvency it is not likely that the plant will be rebuilt.

Personal.

Joseph Glennon has been appointed foreman of the Lappin Brake Shoe Co.'s foundry at Bloomfield, N. J.

J. W. Oliver, president of the American Machinery Co., Grand Rapids, Mich., has left for a four months' trip abroad.

Patrick Dolan has accepted the foremanship of the foundry operated by the F. S. Lovell Machine Co., at Fitchburg, Mass.

Ambrose G. Warren, formerly connected with the Deane Steam Pump Co., at Holyoke, Mass., has accepted a position as mechanical engineer with the J. W. Paxson Co., of Philadelphia.

Mr. A. B. Holmes has been appointed assistant manager of the Standard Pneumatic Tool Co. at Chicago. Mr. Wm. Jennings has been placed in charge of their Pittsburg office at 217 Ferguson Building.

Foundry Chemist or Metallurgist.

H. O. EVANS.

Among the questions that have been before the foundry associations recently and one that has aroused a very considerable interest, and some discussion, is that of the "Foundry Chemist or Metallurgist." That the chemist should appear in the foundry is the natural logic of events, following his successful entry in the blast furnace. His final position there, and sphere of responsibility, does not yet seem settled, if we judge by the opinions we find expressed in the trade journals. Yet it seems as though we have a question to be solved so largely by the abili-

ties and opportunities offered in each case as to eliminate discussion.

Still another phase of the question has recently appeared before the associations, namely, the question of supply and demand—admitting the future of the foundry metallurgist, from where will the supply come.

The natural source is to be found in our trade schools and technical colleges and institutes. In considering these we may safely drop the trade school, as its province and range is indicated by their name, and their efforts should be exerted towards developing a free and intelligent journeyman, who in the respect for his own manhood does not forget the rights of others, and will maintain that freedom of thought and industrial action which has given this country the unique position of a "cheap producer" with a "high wage," the lack of which freedom has often been wrongly called "conservatism" of the foreign manufacturer. From such a class of journeymen would come the foremen, the non-commissioned officers of our industrial army, who bear the brunt of battle, but whose personality is often lost in the nameless "rank and file."

In the technical colleges we will find many giving thorough and complete courses of chemistry, both theoretical and practical; we are not aware of anywhere that a student in that course is given practical work in either foundry or machine shop. In the mining and metallurgical course offered in many colleges a good course of chemistry is usually given, but the practical part is chiefly civil engineering—fitting as indicated by the name of mining engineer.

In the colleges where the foundry has received attention, and there are several that have quite complete installations, running regular heats and doing very creditable work, we will find that the foundry is treated as an adjunct to the machine shop, and has not yet acquired the dignity of a course of its own, though from correspondence with one of the leading colleges we know that such action is considered.

In such a course we believe that the practical and mechanical should dominate the course, though the metallurgist must of necessity be a good theoretical and practical chemist in his province. But his laboratory should divide practice hours with the foundry where the student will familiarize himself with the actual processes of "founding." The machine shop should form a part of the practice in order to learn working properties of his product and the demands made upon it. But it is not necessary that he know how to design or make machinery; sufficient be it that he knows its use.

In the physical laboratory attention should be given to tests made from different heats, with comparison with the chemical tests and the influence of each element noted on the physical properties of the iron. There should also be some time devoted to "metallography," sufficient at least to introduce the student to its methods and the observation of that which he must be taught to see, and thus be enabled later to prosecute his own investigations.

Lastly, some attention should be paid to the business side—such as could be gained by a course of lectures—and in those colleges whereas it should be the practice shop is run on business principles and the product marketed. A complete time and cost system should be in operation, with which the student should become acquainted, and monthly statements should be made and drawn by the students, showing under suitable headings the ratio of capital, labor and material, should be clearly drawn, and the effect of each on the cost of manufacture clearly demonstrated.

This is one of the vital points of manufacture. Next to mechanical skill and equipment is the prompt and accurate knowledge of cost. No sane man will continue to make goods at a loss—if he knows. Yet there are many large manufacturers who do, taking, as they say, the good and the bad, and lumping the cost, with no knowledge at the end of the year, except by guesswork, of what they made or lost on. These works are fewer each year; may their numbers decrease.

That any college can turn out competent and experienced metallurgists no one who has been through a similar course imagines for a moment, comparing what he knew when he graduated with what he has since learned he does not know; but that the fundamental knowledge and training can be acquired which will enable the graduate to quickly and correctly assimilate the practice that will come with independent and original

work, is not to be denied, and from such a training will come the foundry metallurgist of the future.—American Manufacturer.

The Present Condition of the Industry of Manufacturing Steel Castings.*

BY M. A. TISSOT.

It is fifty years since the first steel castings were made, but until quite recently the production was very limited, owing to the difficulty of obtaining the liquid metal in sufficient quantities for making very large castings. Attempts were made at the time of their first appearance to utilize the Bessemer converter and the open-hearth furnace, but not with good results. About 1885, M. Robert invented his converter with side blast, which, applied to the casting of steel, enabled the works to produce complicated castings of excellent quality, and, in fact, created a new industry, for the sphere of their utility has been extending ever since. Many difficulties have, however, had to be surmounted by the steelfounders, and it is only in virtue of their perseverance and ingenuity that the new craft has become a success. The fusing point of steel is very high, ranging from 1,450 degrees to 1,500 degrees, and in working the metal, higher temperatures still are employed. This high fusing point, and the contraction which steel undergoes when it cools, were the source of much vexation to the steelfounder. This shrinkage amounts to from 15 to 18, or even 20 mm. per metre, according to the heat and composition. If the mold offers too great a resistance to this contraction, there is a risk of the casting cracking or becoming crooked. The third source of anxiety was the appearance of flaws, because it is necessary that a steel casting should be perfectly sound. The united efforts of the manufacturers of steel, and of the founders, have, however, overcome every difficulty. After many experiments it was discovered how to prepare a suitable refractory sand, capable of withstanding the intense heat of the molten metal. It is composedd of quartz, sand, silica, brick pounded, and other refractory materials, and it is rendered plastic by the addition of clay. The great shrinkage that steel experiences on cooling has most severely taxed the resources of the founder—and he has only been able to remedy its consequences by a number of contrivances, such as the introduction of ribs to strengthen dangerous parts; the early removal of the core which opposes the contraction of the metal, the releasing the casting while it is still red-hot, etc. With the facility of obtaining a regular supply of metal, the steelfoundries proceeded to improve their plants; the old cranes were replaced by electrical or steam lifting machinery of a power of 30, 50, and 100 tons; cold saws, compressed-air machine tools, and electrical welding, for remedying slight superficial defects, were introduced; and lastly, as denoting the great extension of the industry, the molding machine was adopted in steelfoundries. The converters, with a lateral blast, supplying steel at a very high temperature—which can be stored without becoming too cold to run into the mold enables the founder to turn out with the aid of the machine worked by two men 600 to 1,000 kilos. per day of complicated castings weighing from 5 to 20 kilos. each. Another great improvement effected is the subjecting the pieces during annealing to a sudden cooling or tempering in air, which improves the quality of the steel. The castings are heated to 1,000 degrees and then suddenly exposed to air at from 1,000 to 600 degrees. Their power to resist shocks is thereby vastly increased, and they are more elastic and more tough. Improvements in the construction of the crucible furnace, and the higher temperature now obtainable, enable very delicate and malleable castings to be at the present time made with a metal containing a much lower percentage of carbon than was possible formerly. Sundry correctives to the steel, such as aluminum, nickel, etc., are now added universally. The ameliorations made in the open-hearth furnace during the last ten years have greatly assisted the founder. The temperature, quality, and purity of the metal have been improved. Acid metal is no longer necessarily hard as formerly. Basic furnaces have now been brought to such perfection that with their product excellent castings can be made, which ten years ago was impossible. The judicious employment of aluminum is responsible for this improvement, so that basic steel is in many cases now preferred to acid steel. In both kinds of metals the hardening constituents—car-

*Read before the Mining and Metallurgical Congress at Paris.

bon, manganese and silicon—have been diminished. The following is the average composition of open-hearth foundry steel:

Carbon ....0.25 to 0.50 per cent
Manganese ....1.00 to 0.50 "
Silicium ....0.20 to 0.45 "

The increased employment of cast steel has led to the construction of furnaces of a capacity of 50 tons which are as reliable as those of 21 tons, and they are specially devoted to the production of steel for castings, and only rarely are ingots run from them. The converter, with the lateral blast of M. Robert, or imitations of the same, have now come into general use, and seem to satisfy all the remaining requirements of the steel-founder. Owing to the peculiar arrangement of the tuyeres, the output can be varied from 800 to 2,000 kilos., or from 3,000 to 6,000 kilos. in the two types of the apparatus in use. The heating of the same is easy and inexpensive. The metal is milder than that produced by the Martin furnace, even when not employing any other than ordinary. It possesses great power of resisting shocks and a degree of elasticity which attains 110 kilos. per square milli-metre, it is, therefore, naturally well adapted for war material and marine purposes. Nickel steel with varying proportions of the first-named metal is now also largely manufactured for armorplates, artillery, etc. The first special steels which were introduced, such as chrome and manganese steel, did not produce any greater difficulties to working than ordinary steel. The conditions in forging, tempering, and annealing were much the same as in carbon steel. Later varieties, notably those with a large admixture of nickel, owing to their extraordinary properties, presented difficulties of a formidable nature. Certain steels at the temperature at which carbon steel can be forged, became hard. In others, the process of annealing seems to have an action the very reverse of that it has on ordinary steel, and so forth. It required innumerable experiments and much scientific research to arrive at suitable methods of working the new alloys. According to the theory of Messrs. Carie, steel should be tempered when it is in a feeble magnetic condition at a high temperature. The determination of the point of magnetic transformation would be sufficient therefore in any case to determine the temperature suitable for tempering. Before the new alloys—notably the nickel steel—could be introduced into practical industry, many difficulties had to be overcome, owing to their extreme hardness, which the drills, the cutters of the planing machine, etc., could not attack. However, by annealing the metal and the use of specially made tools, and by working at a reduced speed, the trouble has been overcome. The metal adopted at the works of Imphy for machine tools is chrome tungsten steel, tempered.

A Typical Exhortion.

The foundry meeting at Banes' office last Friday night was lightly attended and no definite arrangements of any kind were made. If Galt wants this enterprise the time is at hand for us to act. A meeting will be held to-night (Thursday) at Ed Banes' law office, and we are expected to determine for all time whether or not the foundry will be located with us. The gentlemen who are at the head of this enterprise hold a proposition from another town who agree to put up the required amount in cash at once, and unless we can do likewise the opportunity must slip from us forever. Mr. Hudson, the gentleman who submitted the proposition, is anxious to locate the plant in Galt on account of its railroad advantages, having two roads, besides it is a growing town surrounded by a fine section of country. Can we afford to let this opportunity of securing a manufacturing plant slip by us? Say No! with an earnestness, get out and hustle, talk it to your friends and attend the meeting to-night. The establishment of a foundry here would mean something to the town. It would furnish steady employment for several of our laboring men, learn our young men and boys to be skilled mechanics and draw a class of trade that we have never before had. The committee appointed two weeks ago, as well as all citizens interested, are requested to work diligently and attend the meeting prepared to make a favorable report to-night.—Galt (Mo.) Herald.

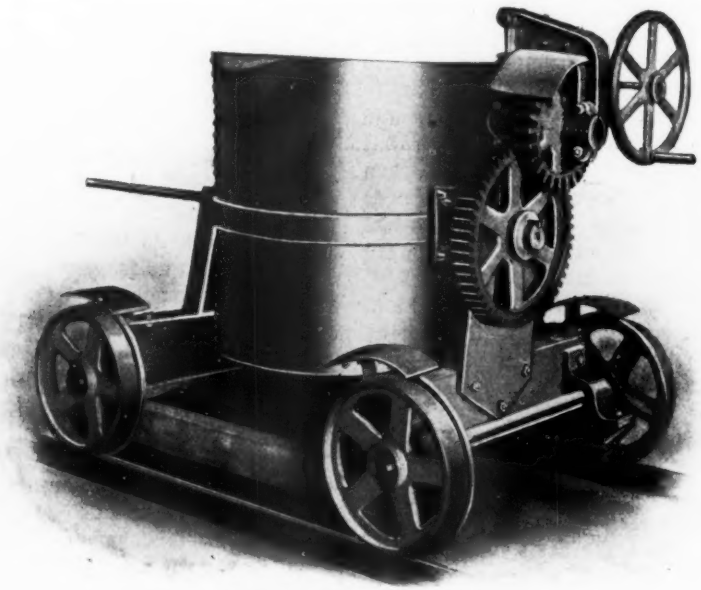
Better Pay at Home.

Col. James W. Reilly, commander of the arsenal, has posted a notice calling for a foreman for a foundry and one for a pattern shop. These men are wanted in the Ordnance department to go to the Philippines. The wages offered are $3.50 per day.—Watertown (Mass.) Enterprise.

New Type Truck Ladle.

The accompanying illustration represents a late design of truck ladle as produced by the Whiting Foundry Equipment Co., Harvey, Ill. (Chicago suburb).

The structural steel frame is formed with low sides made of angle bars which are rigidly connected to the channel end pieces. The boxes are formed with right-angled flanges which are bolted to both frame members. Wheels are chilled, being made of special mixture which this company uses for wheels of all kinds for traveling cranes and various types of trucks. Axles are steel, bearings are fitted with anti-friction rollers.



NEW TYPE TRUCK LADLE.

Cast iron standards, bolted to end pieces through both the webs and flanges of channels, support the ladle on its trunnions.

Tipping gear is mounted in special bracket extending from standard on one side and independent from the cap, so that ladle may be removed from the truck without disturbing the gearing, if desired. The ladle is of standard construction and fitted with bail to which gearing may be attached—a standard crane ladle is the result. The crane truck ladles have same general design of truck frame, but form of standard is modified. This type permits pouring of metal from the truck or with ladle suspended from crane hook, the ladle being separated from truck by simply withdrawing a pin. This design is used for truck ladles of larger capacity; 3,000, 4,000, 5,000 and 6,000 pounds are standard designs.

Printed Matter Received.

"Graphite Facings" is the title of a neat little pamphlet on that subject put out by The Joseph Dixon Crucible Co., Jersey City, N. J. A copy will be mailed those who ask for it.

General Catalogue No. 30, issued by the S. Obermayer Co., Cincinnati and Chicago, contains 232 pages, illustrated throughout. The completeness of this catalogue may be judged by the size of the index, which occupies ten pages. Besides containing a description of modern foundry equipment and supplies, the book also gives a great many pages of useful information. A copy will upon application be mailed to foundrymen in all parts of the world.

From S. R. Church, San Francisco, Cal., we have received advance pages of his new book "Analyses of Pig Iron," which is an illustrated description of the pig iron produced at home and abroad. Wherever analyses have been obtainable these are appended, and in this way the general composition of any iron may be learned by referring to this work. "Analyses of Pig Iron" may be obtained from the publisher at $2.50 per copy to points in the United States, Canada and Mexico. To points in Great Britain the rate is twelve shillings.

Pure East India Plumbago . . . .

SILVER LEAD, GRAPHITE.

Guaranteed to be Absolutely Pure and Unadulterated.

Let us send you a Sample Barrel, and if not as represented return to us at our expense.

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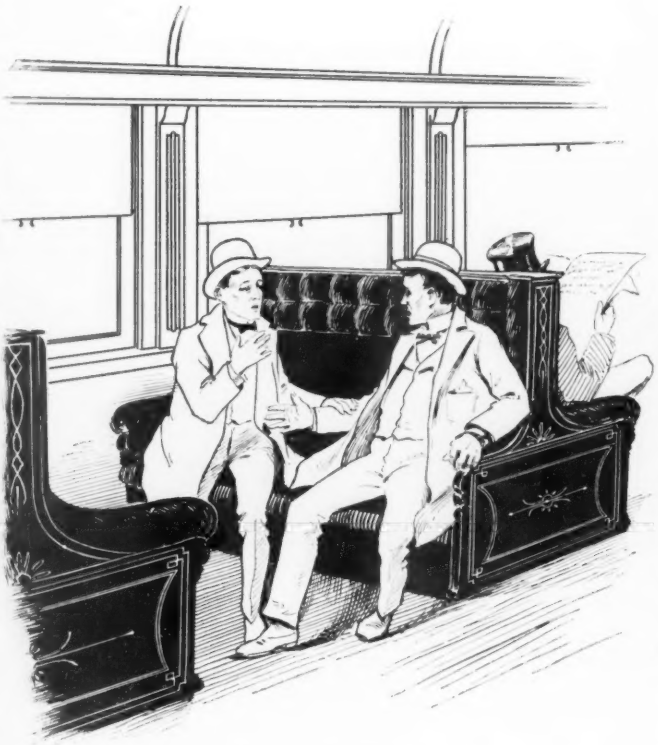
Seal Coal Facing.

Bituminous Facing.

CAR LOADS OR LESS—IN BAGS OR BBLS.

Guaranteed to be ground fine and uniform, go further in use and produce better results than any others.

LET US QUOTE PRICES.

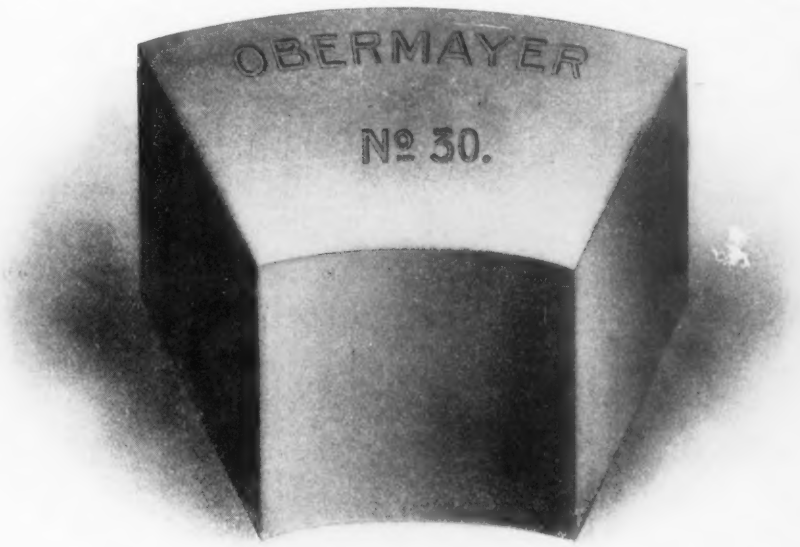


An Argument

Is most always beneficial to someone. A few days ago we heard two parties discussing Cupola Linings. One party (who was interested in the selling of same) advocated a block 9 x 9 x 4½, whereas the other party who was a user insisted on the superiority of a block 9 x 4 x 6. We recommend our Obermayer Block for the reason given in the last issue of THE FOUNDRY, but we wish to assure the trade we are at all times ready to ship on quick notice any of the three styles. We give herewith the various sizes that we have in stock, under the three styles. Special sizes made to order on short notice. They are all made from the same mixture.

No. 10—42 inch outside dia., 30 inch inside dia.
No. 12—48 " " " 36 " " "

No. 13—60 inch outside dia., 48 inch inside dia.
No. 14—72 " " " 60 " " "



No. 30—42 inch outside diam., 30 inch inside diam.
No. 36—38 " " " 36 " " "
No. 42—54 " " " 42 " " "

No. 48—60 inch outside diam., 48 inch inside diam.
No. 60—72 " " " 60 " " "

A—25 inch outside diam., 16 inch inside diam.
B—30 " " " 21 " " "
C—36 " " " 27 " " "
D—39 " " " 30 " " "

E—49 inch outside diam., 40 inch inside diam.
F—60 " " " 51 " " "
G—69 " " " 60 " " "
H—84 " " " 75 " " "

A large stock on hand at Cincinnati, Chicago, and works, Oak Hill. We make everything in the way of Fire Brick.

THE S. OBERMAYER CO.,

CINCINNATI. WORKS: OAK HILL. CHICAGO.

Brass Foundry Equipments

Crucibles,
Shanks,
Tongs,
Brick Linings,
Flask Clamps,
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Over 200 of these furnaces sold in the past year.

We carry four sizes of Furnaces, both forced draft and natural draft in stock.

We are the only concern in the United States that carry **everything in stock ready for immediate shipment** to completely equip an entire Brass Shop.

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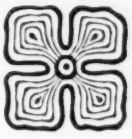
CRUCIBLES for Brass Melting.
CRUCIBLES for Steel Melting.
CRUCIBLES made specially for the different Metals.



CRUCIBLES for Oil Fires.
CRUCIBLES for Coal Fires.
CRUCIBLES for Coke Fires.
CRUCIBLES for Gas Fires.

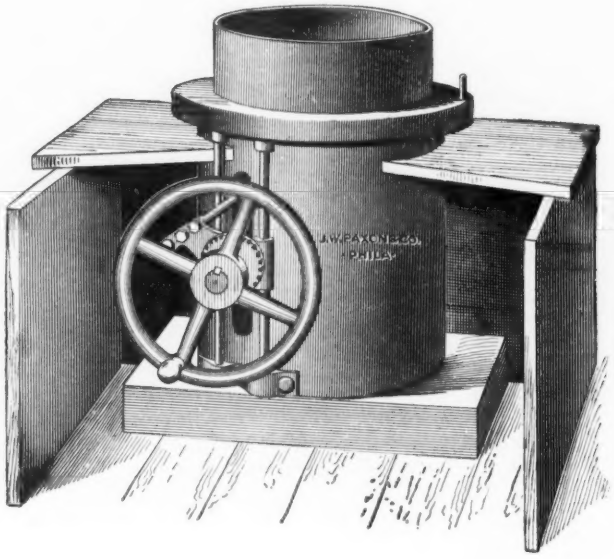
We recognize the fact that different metals and different fires demand different crucible mixtures for the best results and we are prepared in every way to meet that demand.

Although we are the oldest crucible manufacturers in the world, we are up-to-date in every particular, and the knowledge of our chemists and our skilled workmen is at the service of our customers. If you are not quite satisfied with your crucibles or their work, possibly we can help you. We shall be glad to answer any inquiries.

Joseph Dixon Crucible Co.

JERSEY CITY, N. J.

Paxson Pulley Molding Machine.



ANY SIZE CAN BE MADE TO ORDER.

4 inch. to 12 inch Machine.	48 inch to 60 inch Machine,
12 inch to 24 inch "	60 inch to 72 inch "
24 inch to 36 inch "	72 inch to 84 inch "
36 inch to 48 inch "	

This Machine will only make a *Flat* Face Pulley, but a Crown-Faced Pulley can be made by making a collar of required thickness and placed on the Pattern around the rim.

ASK FOR PRICES.

J. W. Paxson Co., 1021 North Delaware Ave., PHILADELPHIA, Pa.

NEW

Paxson-Colliau Cupola

The more you examine it, the better you will like it . . . . . .

The Acme of Science in Cupola Construction . .

All that was Best in the old Colliau Cupola, with Every Improvement suggested by long experience added.

LOCATION AND AREA OF TUYERES INSURE THE HIGHEST MELTING . . . EFFICIENCY. . . . . .

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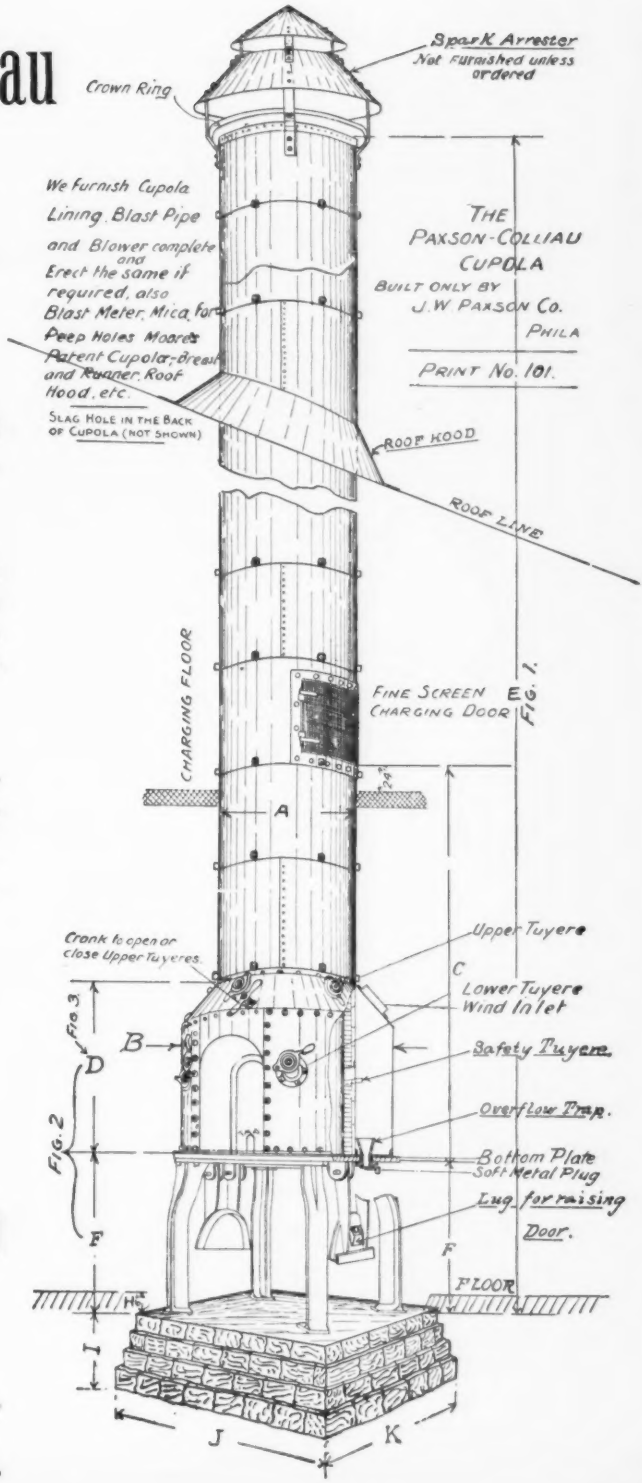

Whitehead Brothers Company,

DEALERS IN

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FIRE SAND,
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FIRE CLAY, KAOLIN,
FOUNDRY FACINGS
and SUPPLIES
OF ALL KINDS.
LEAD FACINGS
A SPECIALTY.

Albany Sand for Brass and Stove Plate Castings.

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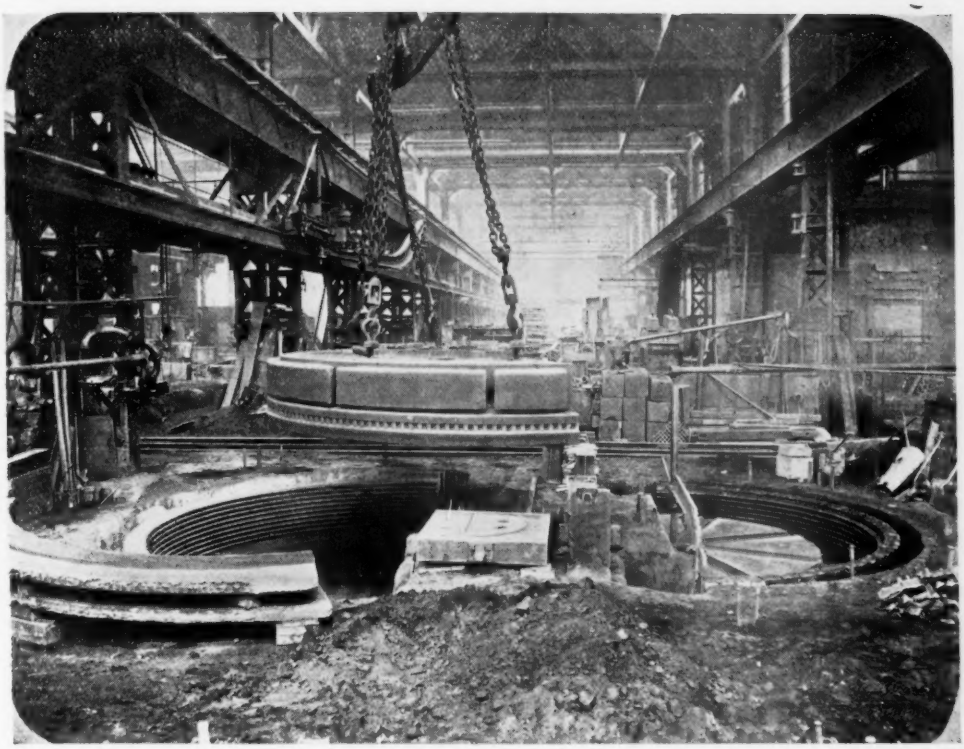

ALMOST ANYTHING

that is dark in color will make a mold look black. No trouble to get something that will make the mold look nice and slick. How about the castings? That is where the rub comes in.

A mold blackened with some imitation of the **C. F. M. Founders' Perfect Wash** may look as well as one blackened with the genuine article. It is when you come to clean your castings that the difference is noticeable. Better looking castings with less work is the standing advertisement for the **C. F. M. Founders' Perfect Wash.**

A barrel will show you what a difference there is in blackings. After a trial we are willing you shall be your own judge as to what kind you want to use.

The Cleveland Facing Mill Co.,

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Molding Sand of all Grades

SHIPMENTS BY RAIL OR WATER—QUALITY OF SAND GUARANTEED.

Our competitors can't touch us on Albany Fire Sand. We've got the "cream of the earth" in that respect, and that's no mere figure of speech either.

OUR COARSE MACHINERY SAND CAN'T BE BEAT.

CEYLON LEAD, FACINGS, SUPPLIES, ETC.

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3500 Acres of Coal.

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300 30-TON COAL CARS

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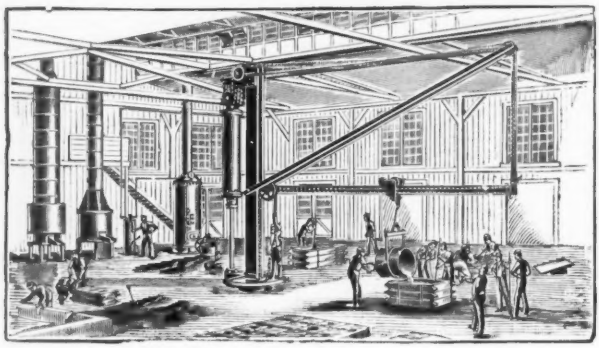


5-Ton Steam Hydraulic Crane in a Foundry.

Just to let you and other people know that when we talk in these cards we are not spinning yarns or spreading fairy tales.

And so here's this letter. Isn't written to us at all, never mind how we got it. It is in no sense a "testimonial," simply one big concern giving another big concern an honest opinion upon a Ridgway machine (and, by the way, it just occurs to us that both these concerns use Ridgway Cranes too, like most all big first-class establishments.) But just listen to this once:

CHICAGO, January 8th, 1900.

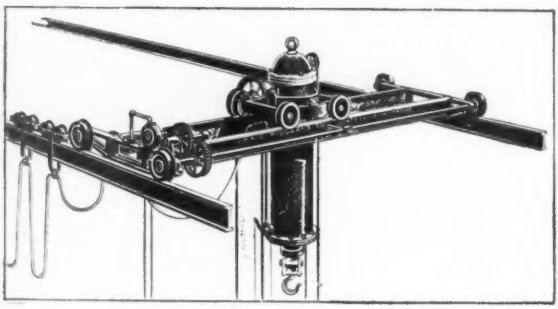
CHAPMAN VALVE CO.,
MR. E. W. BUSS, Western Mgr., 14 No. Canal St., Chicago, Ill.

DEAR SIR:—Answering Mr. Buss' favor of the 5th, will say that our Supt. prefers the air hoist to the electric, and we consider the "Ridgway Hoist" as the best in the market. It is manufactured by Craig Ridgway & Son Co., Coatesville, Pa.

Yours truly, FRASER & CHALMERS, Per H. P. Young.

As Fraser & Chalmers is the largest works in Chicago, and one of the best in the world, and have all kinds of hoisting appliances we don't think we need say anything more to you than to ask if you can take a hint. Can you?

HYDRAULIC AIR HOISTS



Cost more money than any other hoist we know of because they are more costly by far to make. You are to judge whether they are worth the difference in cost. We don't compete with other hoists. We only solicit the trade of those who want the best, knowing the best to be the true cheapest. You don't keep the Ridgway hoist unless you find it really worth its cost.

"PLEASE TAKE THE ELEVATOR"

And be a happy man.

CRAIG RIDGWAY & SON CO., COATESVILLE, PA.

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MODERN FOUNDRY MACHINERY

SAND MIXER.

Not an Experiment

PRACTICAL.
ECONOMICAL.
EXPEDITIOUS.

NOTE.--In order o clearly explain the **Modus Operandi** of this scientific and practical method of **mixing molding sand, facing sand,** and **core sand**, we have issued a small pamphlet which will be sent on application.

Among late Purchasers are :

American Radiator Co., Buffalo, N. Y.
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National Malleable Castings Co., Cleveland, Ohio.
Fischer Foundry & Machine Co., Pittsburg, Pa
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U. S. Arsenal, Rock Island, Ill.
Michigan Malleable Iron Co., Detroit, Mich.
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And YOU would find as they have found, that it is one of the most valuable machines you can put in your Foundry.

Correspondence Is Solicited.

Over 15,000 in Use.

ALWAYS READY!

800 TO 2000 CANDLE POWER.

ESPECIALLY ADAPTED FOR

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PORTABLE, SELF-CONTAINED AUTOMATIC.

NO SMOKE! NO SPRAY! NO SHARP SHADOWS!

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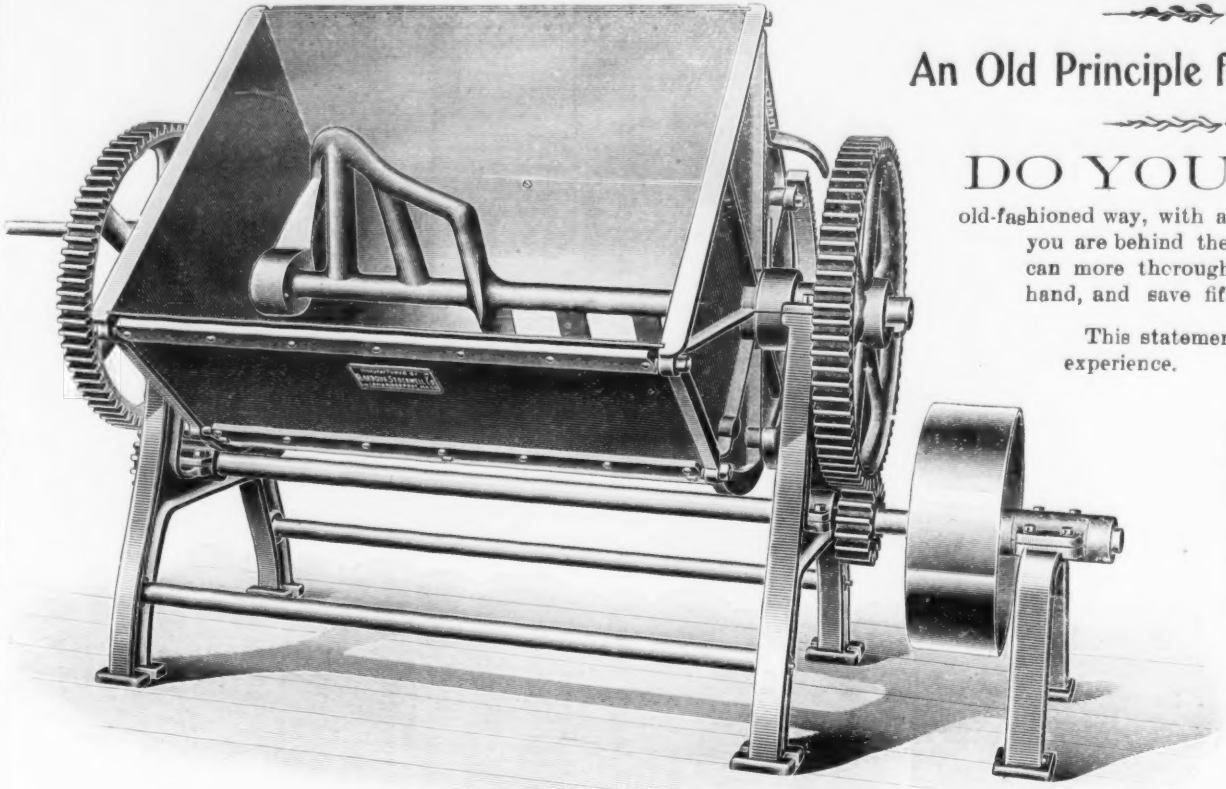
The Wells Light M'f'g. Co, Nos. 44 and 46 Washington St., New York City:

GENTLEMEN—It is contrary to our rule to give testimonials, but an article with the merit of your Wells Light deserves to be made an exception. We have used your lights for the past five years, and consider them indispensable to us.

Yours very truly,
ROSS-MEEHAN FOUNDRY CO.
P. A. BRAWNER, JR., Sec'y, & Treas.

BOSTON FOUNDRY MIXER.



An Old Principle for a New Purpose.

DO YOU mix your facing sand, core sand, fire clay, etc., in the old-fashioned way, with a laborer and a shovel? Then you are behind the times. With this mixer, you can more thoroughly mix it than is possible by hand, and save fifty per cent. of your labor.

This statement can be verified by actual experience.

The material is shovelled into the machine or fed in through a hopper, after riddling. The machine is then started, and in five minutes the mass is perfectly mixed. Turning a crank at the side cants the machine and empties the material either on the floor or into a receptacle provided.

Capacity, 250 lbs. every five minutes.

Pulley, 24 in. diam. x 6 in. face.

Floor Space, 7 ft. x 3 ft.

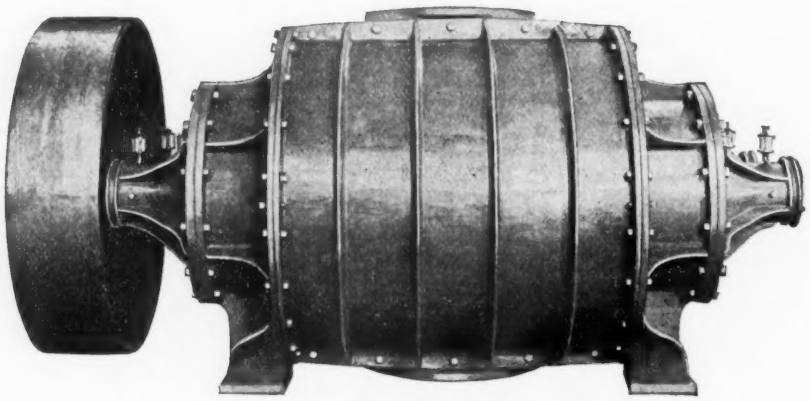
Speed of Pulley Shaft, 125 revolutions.

Weight, 1250 lbs.

For further particulars, write

BARBOUR-STOCKWELL CO., 205 BROADWAY, CAMBRIDGEPORT, Mass.

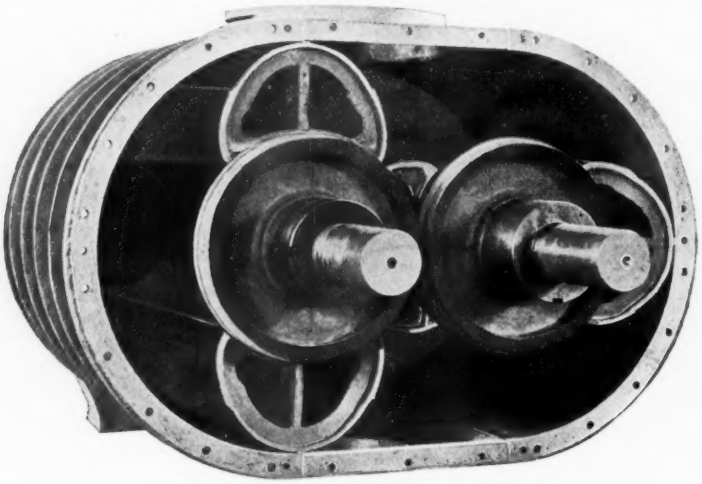
THE GREEN Rotary Pressure Blower



NEW CENTURY PATTERN.

YOU WILL SEE That the working parts are two perfectly balanced impellers mounted on forged steel shafts. They run in bronze bushings, detachable journal bearings and the cut gearing at both ends of the blower is enclosed in oil tight casings.

The Green Blower occupies less space and weighs less than any other Positive Blower in existence.



NEW CENTURY PATTERN—INTERIOR.

Foundry Blowers, High Pressure Blowers, Gas Exhausters, Exhausters for Hot Gases.

THE GREEN GIVES THE MOST VALUE FOR A $.

SEND FOR NEW CATALOGUE B.

Wilbraham Baker Blower Co.,

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Sales Agents: FRAZER & CHALMERS, Inc., Chicago, Ill. and Branch Houses.

ROOTS'

BLOWERS

There are Brier ROOTS
Cube ROOTS
Square ROOTS

BUT ONLY ONE

P. H. & F. M. ROOTS

ALWAYS THE STANDARD.
OTHERS IMITATE, BUT NEVER EQUAL.

Forty years' experience boiled down to the most modern *Pressure Blower* in design and workmanship.

THE ROOTS obtains the *minimum of friction* and the *maximum of efficiency*. Others do not—cannot

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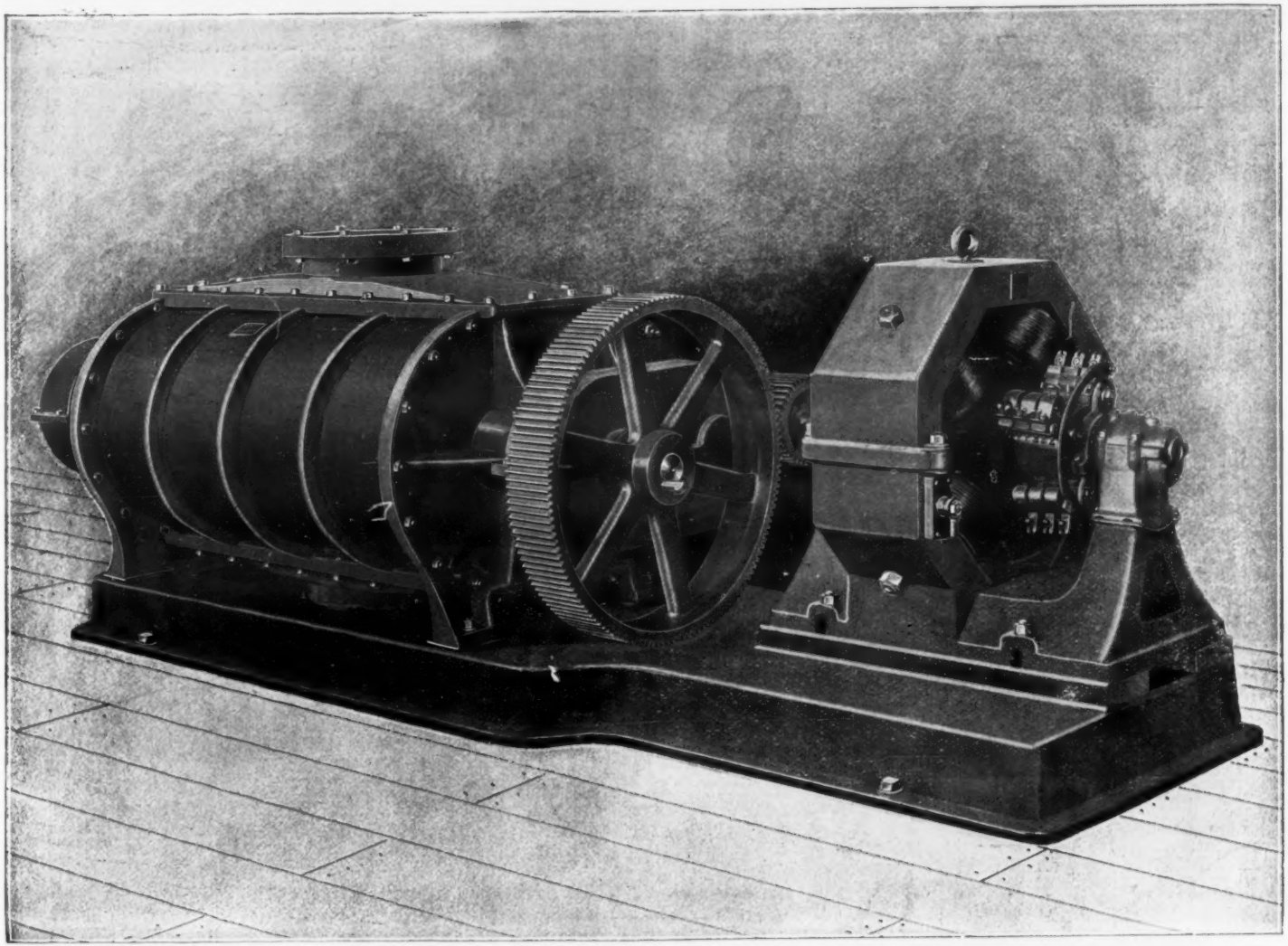

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In up-to-date foundry practice, the time has come when the intelligent use of an iron cement that will withstand fire, water and steam and stay where it is put, has become a shop necessity. A blemish on an iron casting may not injure it, but like a wart on a nose it looks ugly and should be removed. Just here is where Smooth-On Castings is valuable to the manufacturer in saving good castings and to the consumer in avoiding delays in procuring them. Don't use an inferior filling because it is cheap, to do so is neither wise nor economical. Use only the best. Then with an expert, whose good judgment in the use and skill in the application, Smooth-On Castings saves time and money. Smooth-On Castings is useful for many other purposes, daily new uses are being discovered for it.

We make a Smooth-On Compound for Engineers and Steamfitters use, for making connections to withstand high temperatures and high pressures. Unequaled for making Flanged Joints and Boiler Patching.

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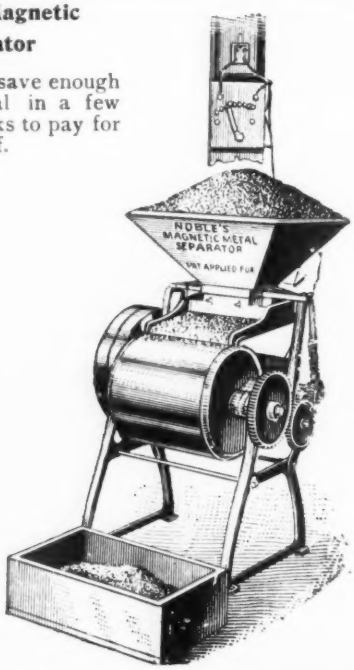
Some of our Specialties

Our Magnetic Seperator

will save enough metal in a few weeks to pay for itself.



Our Gate Cutter

will separate the casting from the gate without bending the castings

Do not let others sell you an inferior Flask. We make the only improved ribbed Flask.

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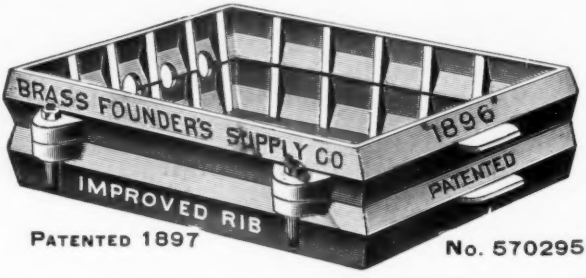
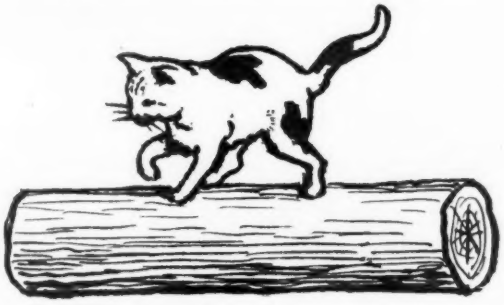


NO OTHERS HAVE THEM.

SEND FOR OUR 1900



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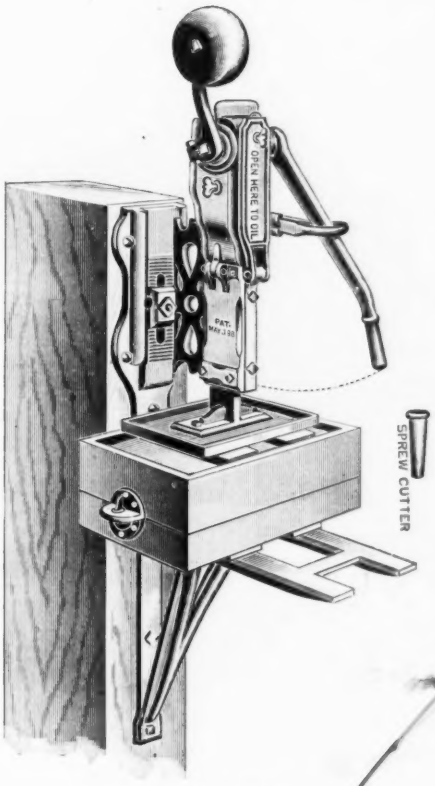
W. B. BURNS'

Economic Molding Machine

SYRACUSE, N. Y.



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QUICKEST Adjusted

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Most POWERFUL

Machine on the market,

Giving a POSITIVE

UNIFORM Pressure.

No DUST can get to WORKING parts

WHICH ARE ALL ABOVE THE SAND PILE.

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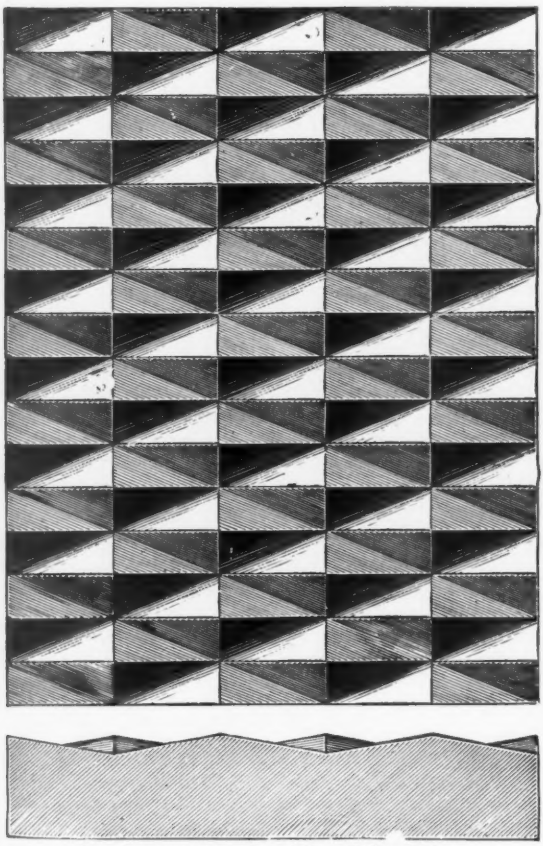
CORRESPONDENCE SOLICITED.



The above cut shows exact size of Diamonds.

Diamond Pattern Lumber,

—FOR—

DOOR SILLS, PLATFORMS, STEP PLATES, Etc.

This Patent Lumber is made by a Special Machine invented by us, the ONLY Machine of its kind, and each piece will match PERFECTLY with all other pieces, by "joining" the edges to the centre, lengthwise, or any row of Diamonds. Size of each piece, 8 feet long by 6 inches wide, and ½ inch thick. Send for sample.

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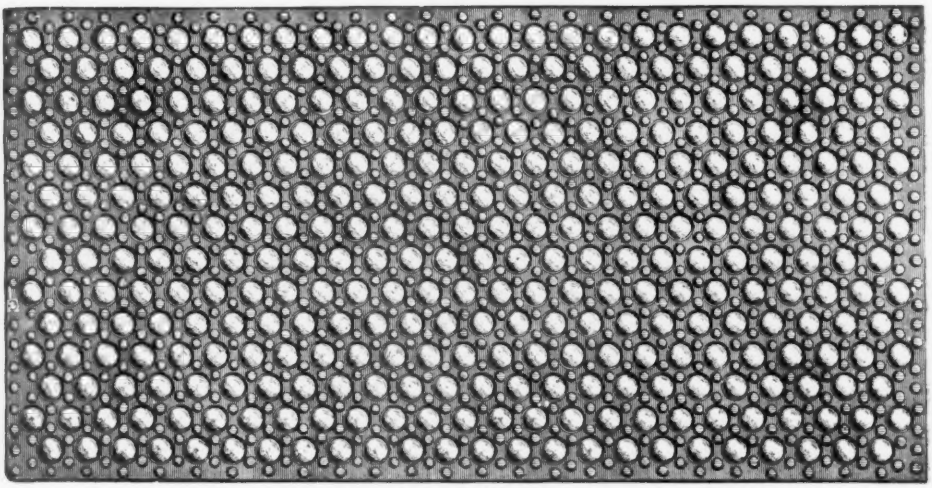

Make your own frames and we will furnish you with Tiles for either Iron or Concrete Lights. Write for prices.

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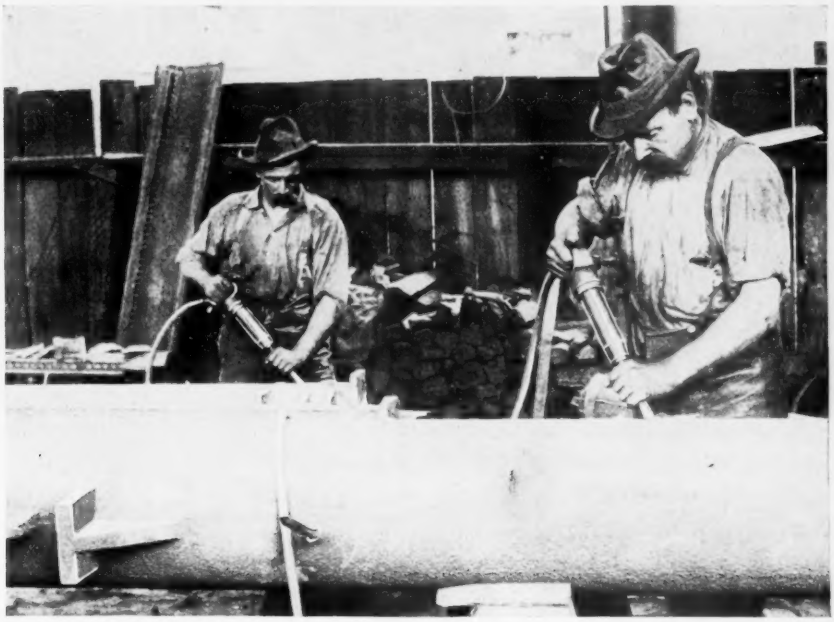
Boyer Pneumatic Hammers



The Boyer Hammers are made for hard service; they prove this by having been in actual use for five years. They are always ready, cost of operation is light and they are portable over shop and yard.

Chicago Pneumatic Tool Co.

MAKERS OF PNEUMATIC APPLIANCES.

GENERAL OFFICES:

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Chip Iron and Steel

Don't throw money away

by running your brass foundry on the happy-go-lucky plan.

What would be a small leak any place else in your plant becomes a large opening in your brass foundry.

All successful managers agree that the best results are only obtained when the workmen are kept steadily employed throughout the day.

This you can not do with a furnace that is not built right. Every minute that you have to spend in patching it up is money thrown away. Whenever the molders have to wait on the furnace some of your good money goes a glimmering.

What is needed in order to have a brass foundry make money is first of all a properly constructed brass furnace. Such a one is the ***Millett Brass Furnace.*** It is built so that it will work right, built so that it will last.

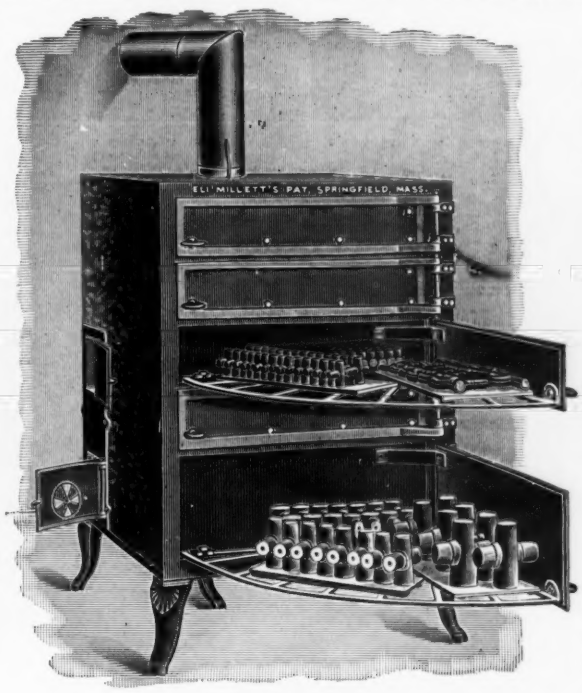
The Millet Furnace is practical. It has proven its claim to superiority through experience.

Will you give us a little information about your requirements in this line, the amount of brass you need daily and the class of work you do? We will then show you wherein we can help you.

Millett Core Oven Co.,

Brightwood, Mass., U. S. A.

Sole manufacturers of the Millett Core Oven and Millett Brass Furnace.



The Small Cores

are the ones that stick you. It is the small cores that you have to wait for. It is the small cores that give trouble and from the imperfections of which castings are lost.

You never have much trouble with large cores, do you? Always seems like it is the small ones that are not what they should be.

The reason you lose work through the faults of small cores is because you are not handling the latter right. When you built your shop you built your core oven for large cores. Never a thought entered your head about the small ones.

Now doesn't it seem to you as if an oven built for large cores is NOT the oven for small cores? It takes a longer time to dry a large core than a small one. Chances are your small core gets more drying than it ought to have.

If you try to take the small cores out of the oven when they ought to come out you are opening the doors of your big oven and interfering with the drying of your large cores. You are breeding trouble all around.

By installing a ***Millett Core Oven*** for your lighter cores, you can get these baked just right, get them at any time. Your big oven with molds and large cores can be let alone, and it too will do its work better.

You will be surprised how much more work, how much better work, your coremakers will turn out with the Millett Oven.

Millett Core Oven Co.,

Sole Manufacturers,

Brightwood, Mass, U. S. A.

Sales Agents: { *S. OBERMAYER CO., Cincinnati and Chicago.*
J. M. PAXSON CO., Philadelphia.

MORE REASONS WHY
THE STURTEVANT BLOWER
EXCELS THE ROTARY BLOWER

Power required to operate at 10-ounce pressure under the same conditions, as determined by Prof. H. M. Howe.

No. 4 1-2 Baker Blower.

No. 1-4 Roots Blower.

No. 10 Sturtevant Blower.

Cost of Blowers of same capacity, as stated by Prof. H. M. Howe.

Positive Blowers.

Fan Blowers.

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Roots Blowers.

Connersville Blowers.

Baker (Green Patent) Blowers.

Sturtevant Blowers.

Average weight per Maker's Catalogues, for sizes of cupolas as given by Mr. Simpson Bolland.

Roots Blowers.

Sturtevant Blowers.

Number in use in the United States, based on reports of cupola practice by Mr. Thomas D. West.

Sturtevant Blowers.

All Rotary Blowers.

Roots Blowers.

Baker Blowers.

The above is from the new Sturtevant Blower Catalogue No. 99. The length of line indicates the relative advantage of the Sturtevant Blower over the Rotary Blower.
Send for Catalogue No. 99 which gives detailed information.

B. F. STURTEVANT CO.,

BOSTON, MASS.

New York. Philadelphia. Chicago. London.

58

The World Rolls

If it slid it would have been worn out with friction long ago.

. . .Sliding and carrying amounts to the same thing. It is a waste of power. . . . . Carrying things in and out of your shop by human strength and muscle is not the way to secure a profit on your work. . . . . Your competitors are not doing it. They can't afford to. Their shops from one end to the other are traversed by trolley tracks. A spur goes out to the flask yard. Another spur goes to the sand shed. Still another to the cleaning and chipping room. . . . No expensive cranes, mind you. No expensive posts and foundations. Just a plain trolley track. The only apparatus for handling materials that is in nobody's way. . . . . When you want sand, a load can be delivered on any floor without fussing and fretting about gangways. When castings are to go out you are up, gone and done with the job before a man with a truck could get ready to start. . . . . Of course your iron is delivered to your molders by this same trolley track. Less labor, less cost all around. . . . . Won't you investigate the trolley track as a means of lessening your cost of Production? ***The Coburn*** represents the highest standard. Take half an hour to tell us how your shop is built, the amount of iron you handle and the kind of work you do. We will take pleasure in showing you a plan for improvement. . . .

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We Sell our Own Iron

We know how it is made and what kind of ores have been used in making it. We can guarantee it because it is our own product.

You can not expect this kind of a guarantee from an agent, who is often compelled to change brands owing to the oversold conditions of furnaces.

Hundred of foundries are having difficulty in producing soft castings. To such we say, use

Cherry Valley Foundry Iron.

It is an iron with a reputation twenty-five years old. It is an iron that can be relied upon.

Some people may tell you that soft irons can not be obtained. We have a limited quantity ready for immediate delivery.

It is estimated that foundries during the present year will consume from ten to twenty per cent. more iron than in the year just closed. Hadn't you better look ahead a few months and contract for a share of our output?

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Leetonia, Ohio.

"LITTLE GIANT"

Pneumatic Hammers

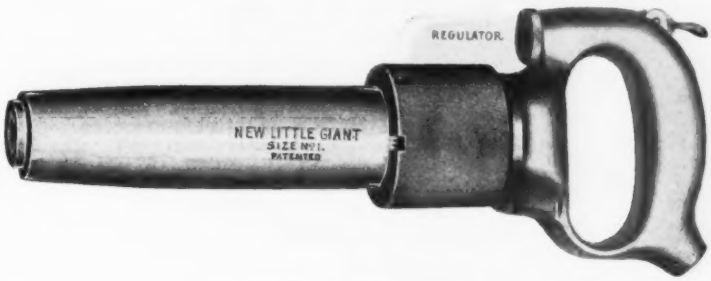
ARE ESPECIALLY DESIGNED FOR CHIPPING CASTINGS.

LIGHT. SIMPLE IN CONSTRUCTION.

DURABLE. EFFICIENT.

They have an air regulator which can be so adjusted as to admit a minimum amount of air and yet deliver a blow with full force of hammer under various pressures.

MADE IN ALL SIZES. Used in Foundries throughout the World.



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FOR

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To those who desire to reach this trade it offers the most reliable directory that has ever been published.

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Best for Malleable Furnace and Cupola Work.

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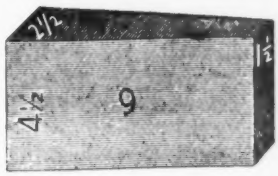
High grade FIRE BRICK.

Best for Rolling Mills, Blast Furnaces, Foundries, etc. "Try our Cupola Blocks and Scioto Ground Clay."



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A PERFECT SUCCESS
AS A MACHINE.

A PERFECT SUCCESS
AS A MEANS OF
SAVING TIME, MONEY AND METAL IN THE FOUNDRY.

IN THE FIRST PLACE you can do heavy molding in one quarter the time required for hand ramming, **and one man can work it.**

IN THE SECOND PLACE, the mold will be rammed harder and more uniformly thus preventing "straining" and consequent loss of 10% to 20% of metal.

MADE IN THREE SIZES.

Small size for hand use. Large sizes for suspension from crane.

Easily and quickly put up and moved about over the work.

A great labor saver in **Pipe Foundries.** Special attachments for this work.

When the Casting cools off use our Pneumatic Hammer for Chipping. All sizes.

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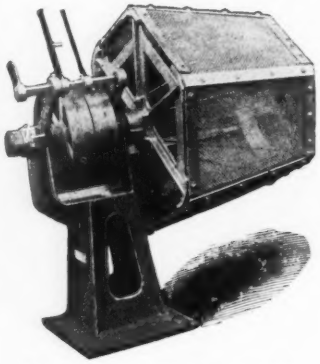
Electric, Compressed Air and Hand Power Cranes for any Service.



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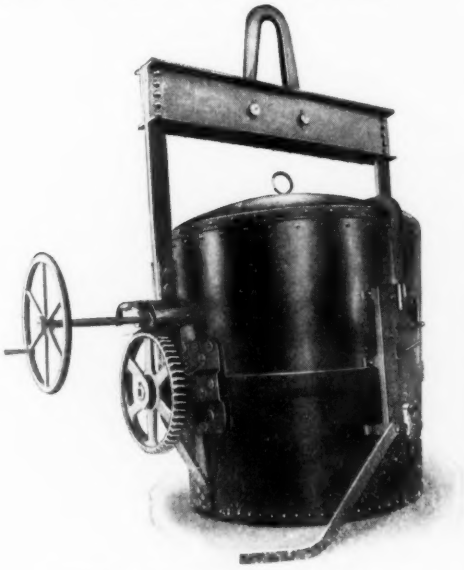

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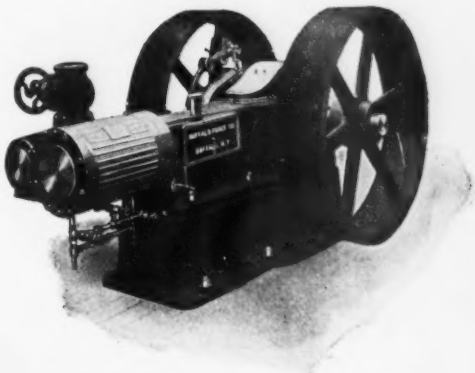

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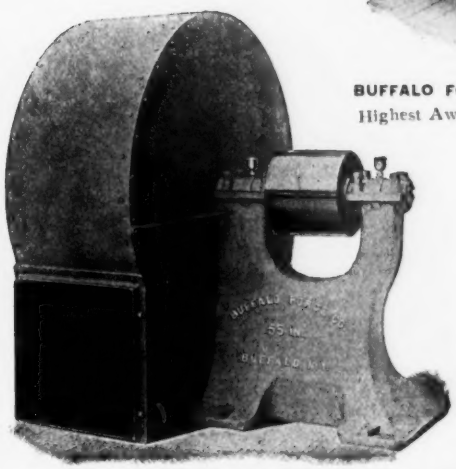

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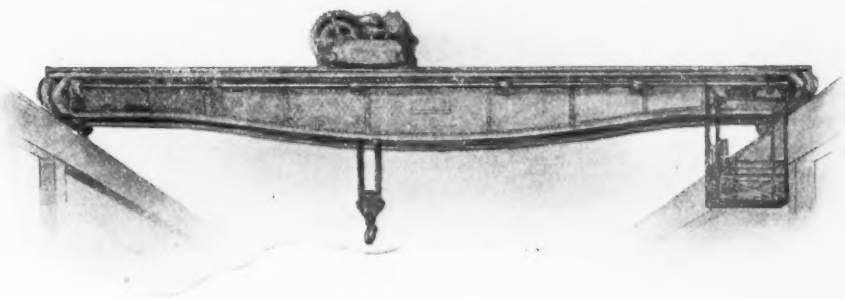

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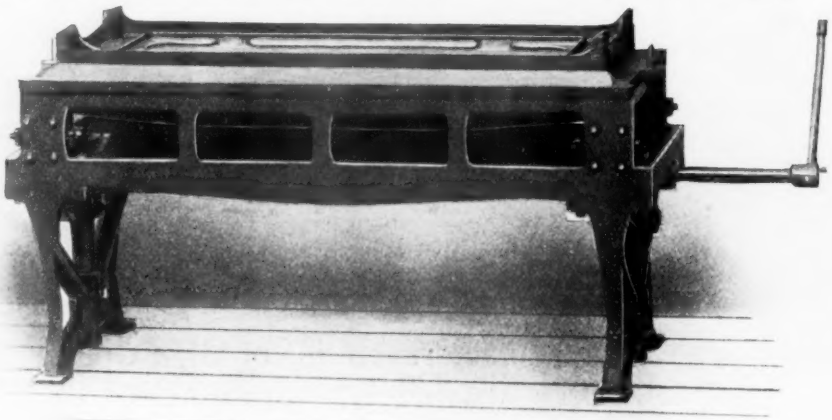
SAND MOLDING MACHINES



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will clean a casting just as well as the best plumbago. The price of plumbago has reached a figure where it is very expensive to use the genuine article. You can use soapstone just as well as plumbago on the majority of castings. The difference in price is a clear gain.

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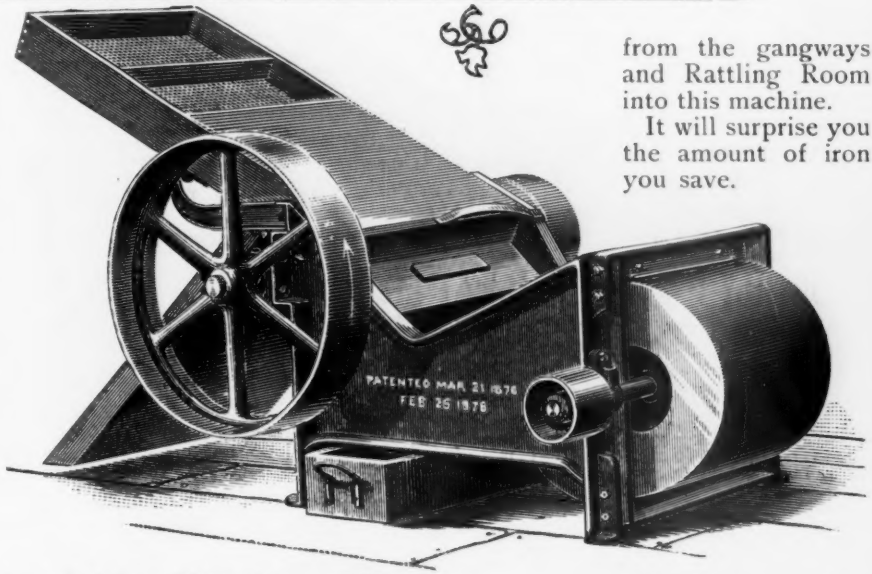

from the gangways and Rattling Room into this machine.

It will surprise you the amount of iron you save.

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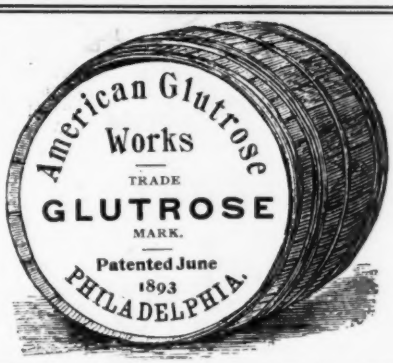

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Dear Sir:—The machine fills the bill; am just delighted with it.
Yours truly,
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They save such a surprising lot of time and turn out so much more accurate work than otherwise obtainable that you cannot afford to do without them, but you should have a full equipment to get the best results. We would like an opportunity to explain this

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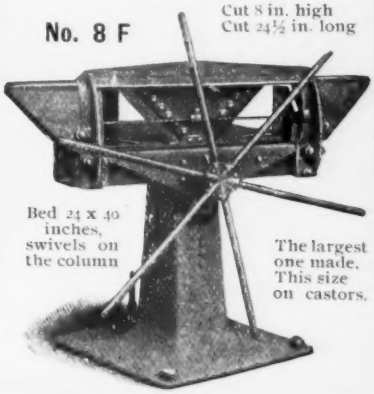

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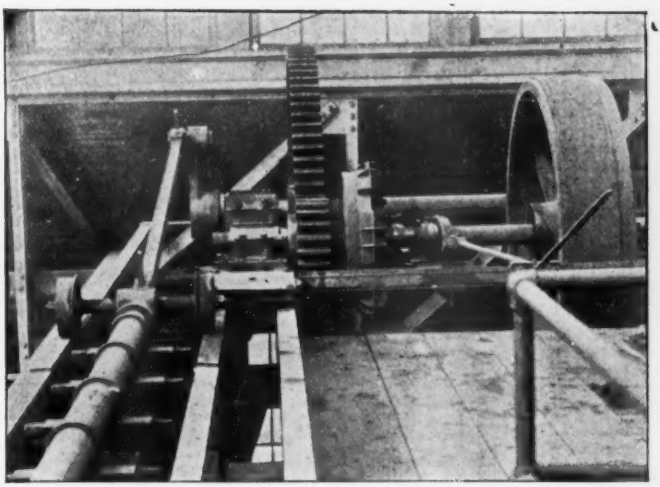

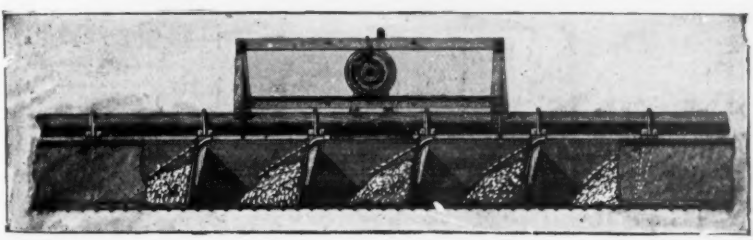

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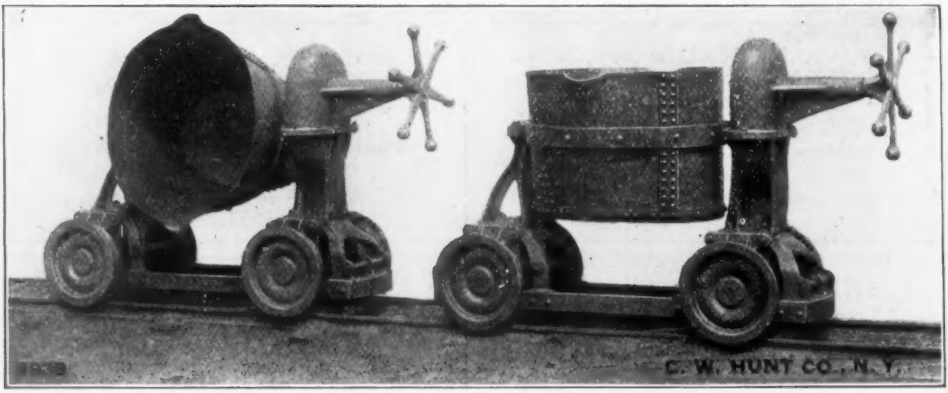

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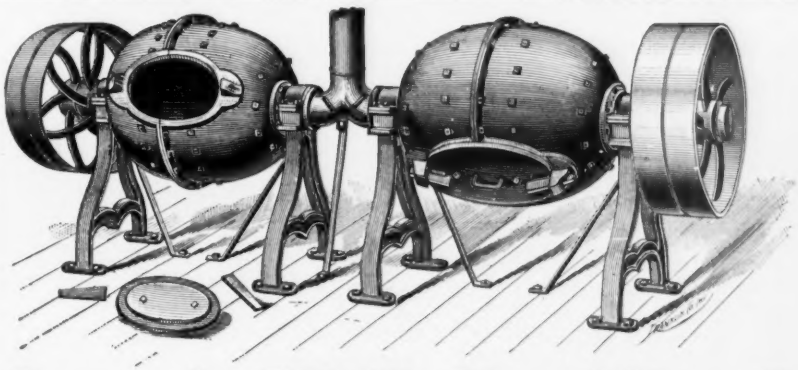

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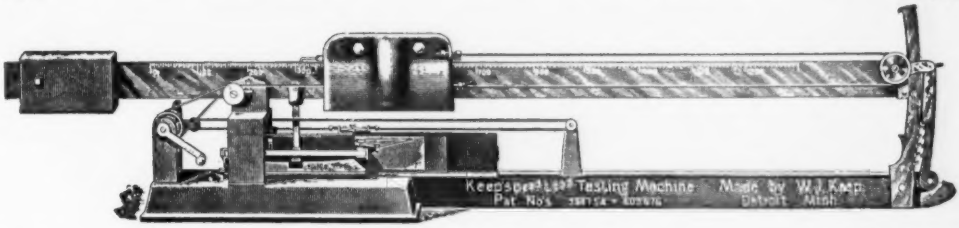

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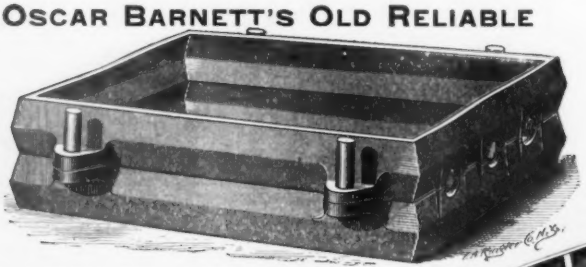

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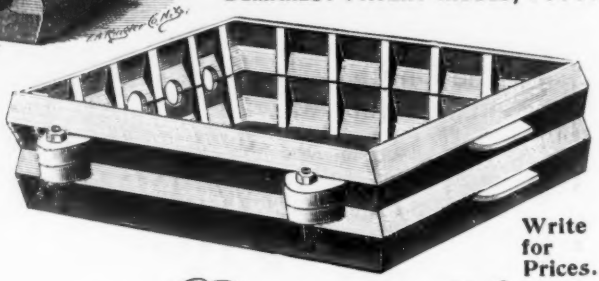

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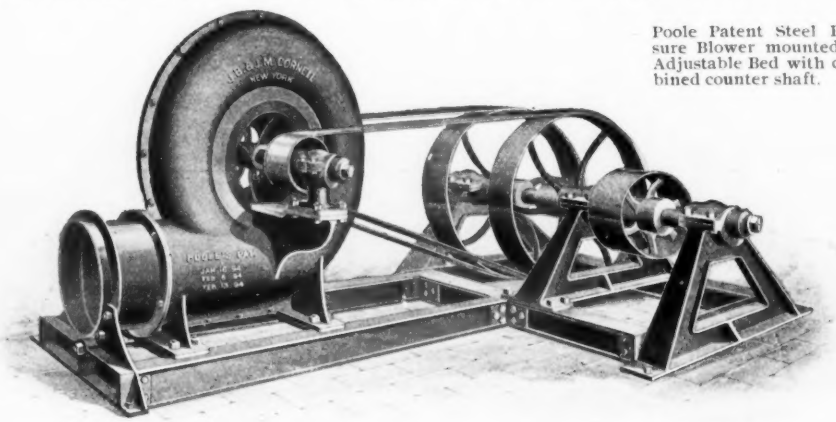

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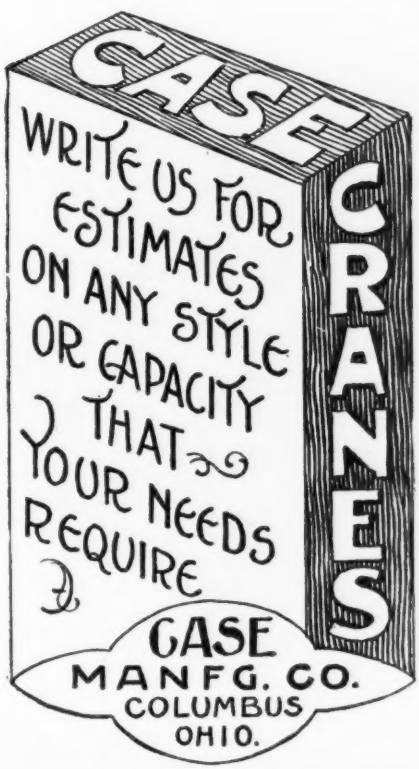

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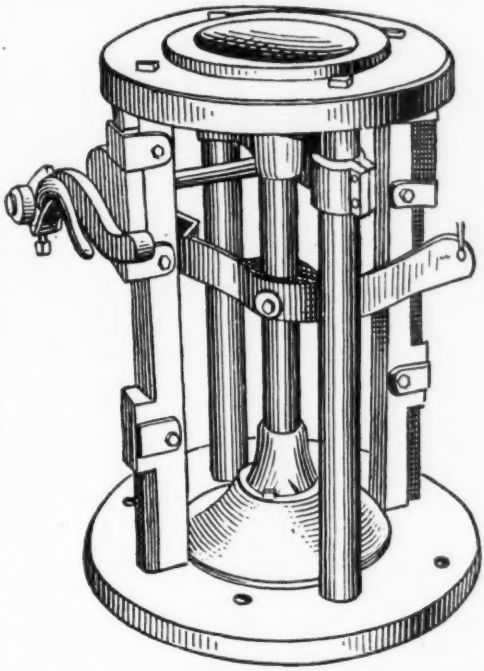

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A Perfect Mixture is Possible

but many foundrymen have yielded to the temptation to use "any old thing" during the past year, on account of the scarcity of pig iron.

The extra time and attention necessary to make satisfactory mixtures from job lots has demonstrated that

It Costs But Little More

to buy a regular supply of first-class standard brands from agents handling all varieties of pig iron and coke. It pays to tie up to those who have had many years experience, whose reputation for fair dealing is unquestioned, who have iron at all times and from whom

You Can Get It

when needed.

Careful attention is given to each contract, whether it is for a single carload or ten thousand tons. Since Jan. 1st, 1899, orders have been received

From

nearly all parts of the civilized world and have amounted to about 50 per cent. more than during 1898.

Don't forget us when you want Pig Iron or Coke.

Rogers, Brown & Co.,

Cincinnati.	New York.	Chicago.	Buffalo.	Philadelphia.
Pittsburg.	Cleveland.	Boston.	St. Louis.	Birmingham.

Brass Foundry Equipments

Crucibles,
Shanks,
Tongs,
Brick Linings,
Flask Clamps,
Molding Sand,

Bench Rammers,
Ingot Molds,
Drying Stoves,
Spill Trough,
Tumbling Barrels,
Metal Separators,
Blowers.

FORCED DRAFT FURNACE, CAST IRON GRATES

Over 200 of these furnaces sold in the past year.

We carry four sizes of Furnaces, both forced draft and natural draft in stock.

We are the only concern in the United States that carry **everything in stock ready for immediate shipment** to completely equip an entire Brass Shop.

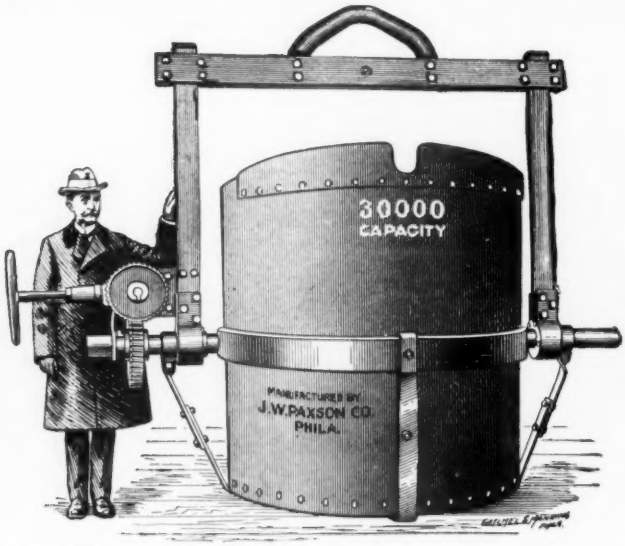
For full particulars address

EQUIPMENT DEPARTMENT

THE S. OBERMAYER CO.,

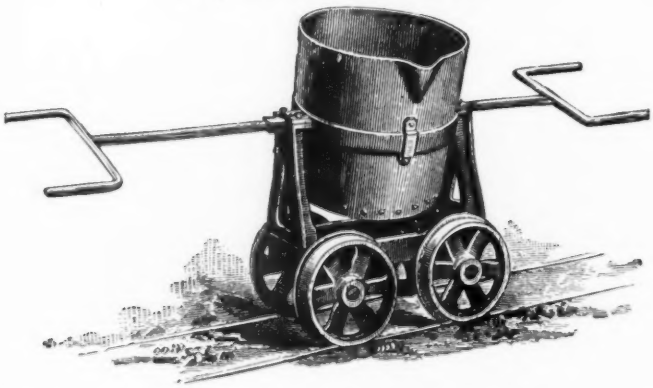
CINCINNATI. CHICAGO.

Large Crane Ladles WORM GEARED



No. A—GEARING No. 1—BAIL No. 1—LIP

TRUCK LADLES



Made in all sizes and styles from 50 lb. to 30,000 lb. capacity.

ASK FOR PRICES LARGE STOCK ON HAND

MADE BY

J. W. Paxson Co. 1021 North Delaware Ave., PHILADELPHIA, PA.

NEW

Paxson-Colliau Cupola

The more you examine it, the better you will like it . . . . . .

The Acme of Science in Cupola Construction . .

All that was Best in the old Colliau Cupola, with Every Improvement suggested by long experience added.

LOCATION AND AREA OF TUYERES INSURE THE HIGHEST MELTING . . . EFFICIENCY. . . . . .

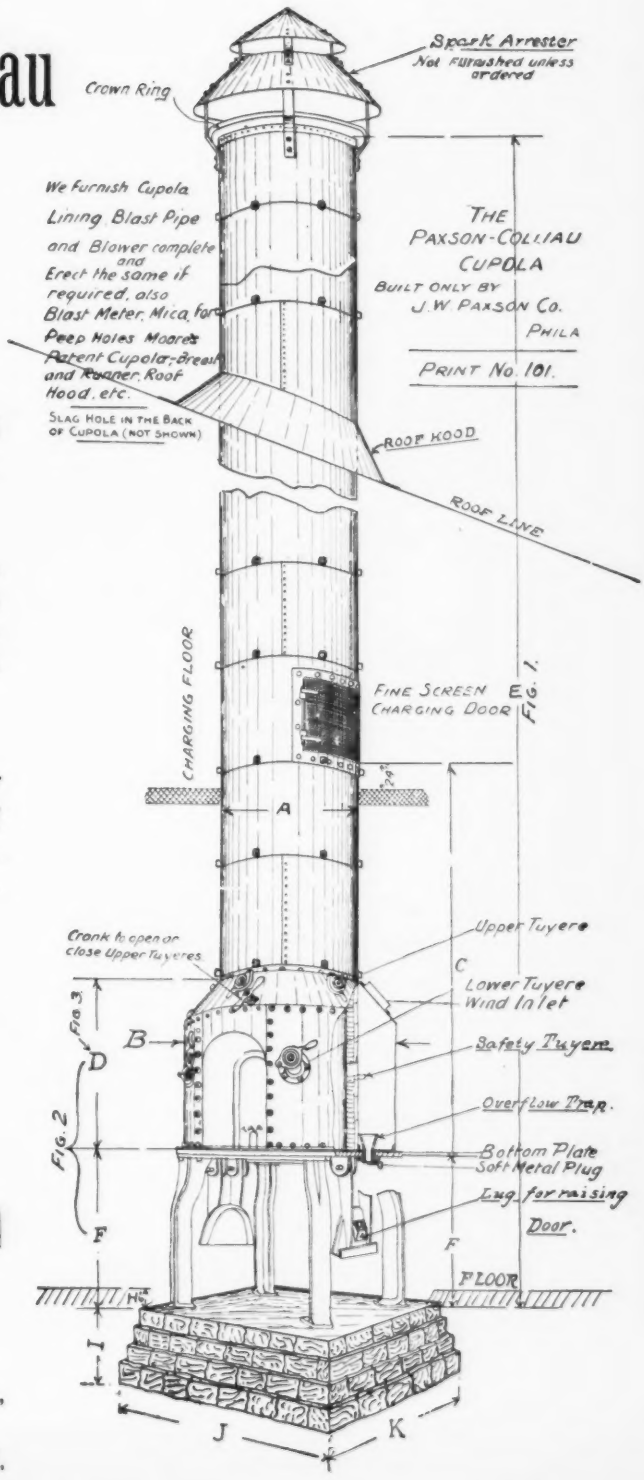
It keeps us hustling to fill the orders for these goods.

MADE ONLY BY THE

J.W. Paxson Co.

1021 . . .
North Delaware Avenue,

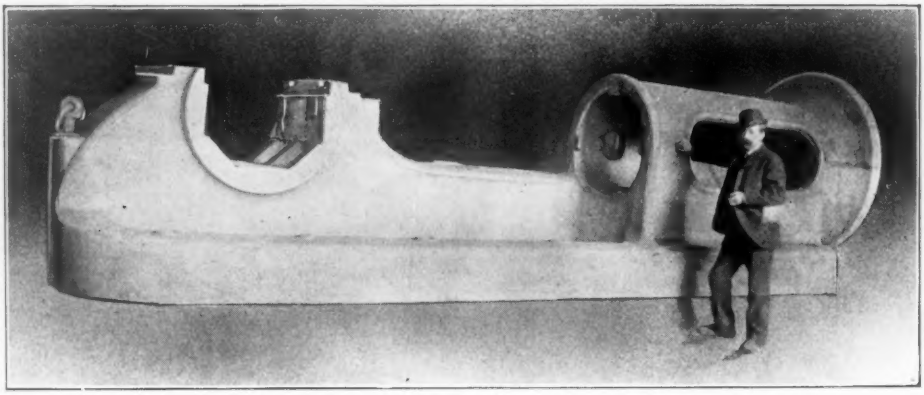
PHILADELPHIA, PA., U S. A.



BED PLATE FOR LOW
PRESSURE SIDE OF

Cross Compound Engine

WEIGHT 55,000 POUNDS, LENGTH 21 FEET.



DID YOU EVER SEE PRETTIER WORK?

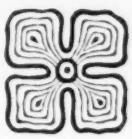
One of a series of twenty made by the Pennsylvania Iron Works Co., of Philadelphia. Molded in Lumberton Molding Sand (Moore's Farm Brand) and Millville Gravel with Blacking furnished by the

J. W. PAXSON CO., PHILADELPHIA, PA.

This combination makes castings that people talk about. Would you like to turn out some of the same kind? (See article in reading columns for further description of these castings.)

Crucibles

CRUCIBLES for Brass Melting.
CRUCIBLES for Steel Melting.
CRUCIBLES made specially for the different Metals.



CRUCIBLES for Oil Fires.
CRUCIBLES for Coal Fires.
CRUCIBLES for Coke Fires.
CRUCIBLES for Gas Fires.

We recognize the fact that different metals and different fires demand different crucible mixtures for the best results and we are prepared in every way to meet that demand.

Although we are the oldest crucible manufacturers in the world, we are up-to-date in every particular, and the knowledge of our chemists and our skilled workmen is at the service of our customers. If you are not quite satisfied with your crucibles or their work, possibly we can help you. We shall be glad to answer any inquiries.

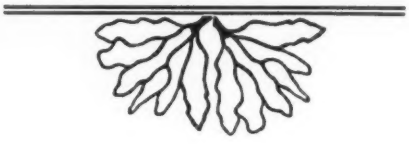
Joseph Dixon Crucible Co.

JERSEY CITY, N. J.

Whitehead Brothers Company,

DEALERS IN

Molding Sand



FIRE SAND,
PHILADELPHIA SAND
FRENCH SAND,
FIRE CLAY, KAOLIN,
FOUNDRY FACINGS
and SUPPLIES
OF ALL KINDS.
LEAD FACINGS
A SPECIALTY.

Albany Sand for Brass and Stove Plate Castings.

537=39 *West 27th St.,*
NEW YORK.

Providence Office,
42 S. Water Street.

Buffalo Office,
70 and 72 Columbia St.

WORKS AT

CHEESEQUAKE CREEK, N. J.
SOUTH RIVER, N. J.
RARITAN RIVER, N. J.
SOUTH AMBOY, N. J.
WAREHAM, MASS.
CENTRE ISLAND, L. I
WATERFORD, N. Y.
ALBANY N. Y.
CEDAR HILL, N. Y.
COXSACKIE, N. Y.
CLINTON POINT, N. Y.
ATHENS, N. Y.
COEYMANS, N. Y.
WILLOW SPRINGS, N. Y.
POUGHKEEPSIE, N. Y.
CRESCENT, N. Y.

SOME PEOPLE RUB

away on a casting for half a day, when, if they would use the **C. F. M. Founder's Perfect Wash** on their molds they could do that same job in fifteen minutes.

Pieces of coke, wire brushes and scrapers must all be pushed along by human power. The less you have to use these materials the lower the cost of your castings. Some foundrymen like to boast of getting along with less than a barrel of Plumbago in a year. It is nothing to boast of. It is only another specimen of false economy. Those people have yet to learn that the cheapest way to clean a casting is to make their molds so they will not stick to their castings. Sand alone will not do this, neither will sea-coal. Some blackings will work well under one condition and not under others. It is here that the **Cleveland Facing Mills Founder's Perfect Wash** gets ahead of all preparations.

There is not a casting made, from the heaviest to the lighest, but what can be cleaned perfectly by its use. A heavy casting will require a heavier coat of the **Wash** than a lighter one. That is all the difference there is. For a light casting shake it on with a bag and you will have a casting to be proud of. The **Wash** will not run before the iron and leave dirty streaks. For medium sized castings the **Wash** applied with a camel hair brush will give a coat of sufficient thickness. For heavier work it should be applied by the hand or gone over twice with the camel hair brush. For loam and dry sand work apply the **Wash** with a swab. Pure water and the **Wash** is all that is needed. Other blackings may need molasses, clay-wash, flour and other ingredients. The **Founder's Perfect Wash** does not.

Will you continue to buy half a dozen different blackings to suit your work when the **Wash** will do better work everywhere than any one of them?

Catalogue of up-to-date supplies upon request.

The Cleveland Facing Mill Co.,

FRANK H. CHAMBERLIN, Proprietor. **CLEVELAND, OHIO.**

M. M. COCHRAN, PRES.
J. R. LAUGHREY, VICE-PRES.

JNO. H. WURTZ, SECY.-TREAS.
J. S. NEWMYER, MANAGER.

WASHINGTON COAL & COKE CO.

CAPITAL, PAID UP, $500,000.

3500 Acres of Coal. **5000 Tons Daily Capacity.**

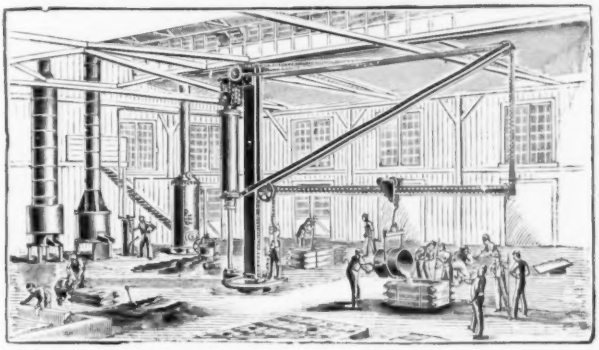
350 COAL AND COKE CARS — 500 COKE OVENS.

Foundry Coke Our Specialty.

GENERAL OFFICE—
DAWSON, FAYETTE CO., PA.

SALES OFFICE—PITTSBURG, PA.
N. P. HYNDMAN, SALES AGENT.

THE VERY FIRST FELLER



5-Ton Steam Hydraulic Crane in a Foundry.

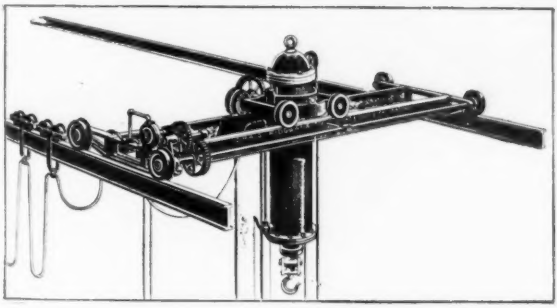
To hook up Steam with Water and Air with Water to "hoist" things or to push things or to turn things was yours truly. Of course everybody knows that. Had even to invent a name for the thing and called it "Steam-Hydraulic" and "Air-Hydraulic," because it seems like a contradiction of terms—as if you said "Steam-Gas Engine," but they have become household words. Now everybody says "Ridgway Steam-Hydraulic."

When yours truly first tried to sell these machines—well!—people thought we were a fool to turn steam in on water for economical work and we were laughed out of offices and had we not been young and hopeful would have had a broken heart. It was an up-hill fight, but we have made the Steam-Hydraulic and the Air-Hydraulic a grand success and the best system known and the most economical.

We have patents. We are men of but one idea. We are up-to-date in the matter of safely handling things with steam and air. We have patents granted us but not issued on account of the covering in foreign lands which are more valuable even than the older ones. We are doing great quantities of special work in applying these systems. Are doing it for the greatest concerns in the land. If ever you have occasion to hoist, or push, or turn things don't fail to tell us about it. We will attach your boiler to the work with either steam or air and save you thousands of dollars.

Our only concern is to have you know about us. We run this card for this purpose. We don't tell all we could in these cards. We try to be as quiet as we can and saw wood. Have to talk a little to get your attention. Write to us about your problems or come and see us. We won't come and see you unless we are invited, that's one of our peculiar ways.

HYDRAULIC AIR HOISTS



This is another one of our peculiar names which is a kind of contradiction, but it nicely describes the machine and sets it out apart from any other air hoist in the world. This is the machine everybody wants, and we are getting ready to build a big lot of them for a large concern up to 50 tons capacity. Who would dare to handle such a load with any other air hoist? Why don't you want your 5-ton hoist as safe as a 50-ton must be? This hoist costs more to build, but what are dollars as against life?

"PLEASE TAKE THE ELEVATOR"

Like Most People are Doing.

CRAIG RIDGWAY & SON CO., COATESVILLE, PA.

EUROPEAN AGENT,

CHAS. G. ECKSTEIN, 16 Spandaurster., Berlin, Germany.

William Sellers & Co., Incorp.

PHILADELPHIA.

MODERN FOUNDRY MACHINERY

SAND MIXER.

Not an Experiment

PRACTICAL.
ECONOMICAL.
EXPEDITIOUS.

NOTE.--In order to clearly exp'ain the **Modus Operandi** of this scientific and practica method of **mixing molding sand, facing sand,** and **core sand**. we have issued a small pamphlet which will be sent on application.

Among late Purchasers are :

American Radiator Co., Buffalo, N. Y.
American Radiator Co., Titusville. Pa.
National Malleable Castings Co., Indianapolis, Ind.
National Malleable Castings Co., Cleveland. Ohio.
Fischer Foundry & Machine Co., Pittsburg, Pa
R. Hoe & Co., New York.
U. S. Arsenal, Rock Island, Ill.
Michigan Malleable Iron Co., Detroit, Mich
New York Air Brake Co., Watertown, N. Y.
Norfolk & Western R. R., Roanoke, Va.

And YOU would find as they have found, that it is one of the most valuable machines you can put in your Foundry.

Correspondence Is Solicited.

Over 15,000 in Use.

ALWAYS READY!

800 TO 2000 CANDLE POWER.

ESPECIALLY ADAPTED FOR

FOUNDRIES

PORTABLE, SELF-CONTAINED AUTOMATIC.

NO SMOKE! NO SPRAY! NO SHARP SHADOWS!

Now in Valuable Use With Hundreds of Foundries,

In addition to 400 Railroads and over 500 Contractors.

ROSS MEEHAN FOUNDRY CO.
CHATTANOOGA, TENN., May 5, 1896.

The Wells Light M'f'g. Co., Nos. 44 and 46 Washington St., New York City:

GENTLEMEN—It is contrary to our rule to give testimonials, but an article with the merit of your Wells Light deserves to be made an exception. We have used your lights for the past five years, and consider them indispensable to us.

Yours very truly,
ROSS-MEEHAN FOUNDRY CO.
P. A. BRAWNER, JR., Sec'y, & Treas.

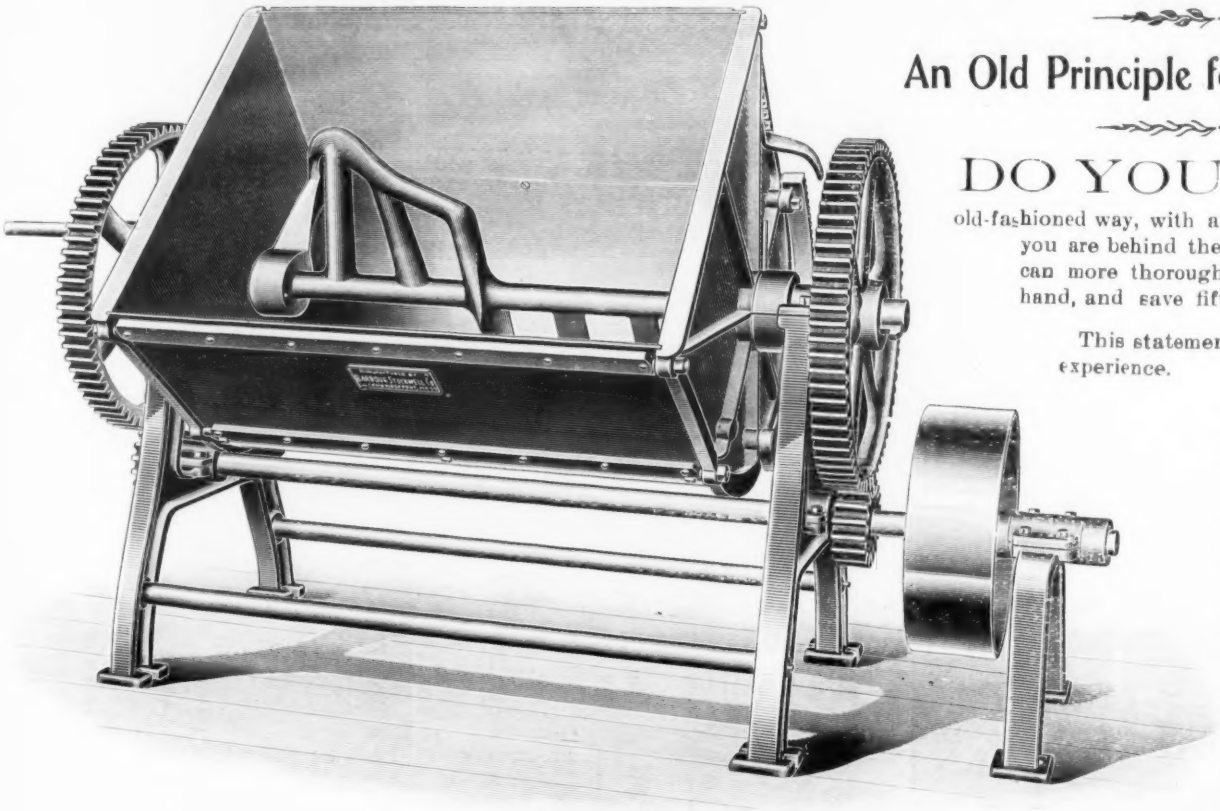
REQUEST CIRCULARS FROM

THE WELLS LIGHT M'F'G. CO.,

EDWARD ROBINSON, Sole Proprietor.

44-46 WASHINGTON STREET, NEW YORK.

BOSTON FOUNDRY MIXER.



An Old Principle for a New Purpose.

DO YOU mix your facing sand, core sand, fire clay, etc., in the old-fashioned way, with a laborer and a shovel? Then you are behind the times. With this mixer, you can more thoroughly mix it than is possible by hand, and save fifty per cent. of your labor.

This statement can be verified by actual experience.

The material is shovelled into the machine or fed in through a hopper, after riddling. The machine is then started, and in five minutes the mass is perfectly mixed. Turning a crank at the side cants the machine and empties the material either on the floor or into a receptacle provided.

Capacity, 250 lbs. every five minutes.

Pulley, 24 in. diam. x 6 in. face.

Floor Space, 7 ft. x 3 ft.

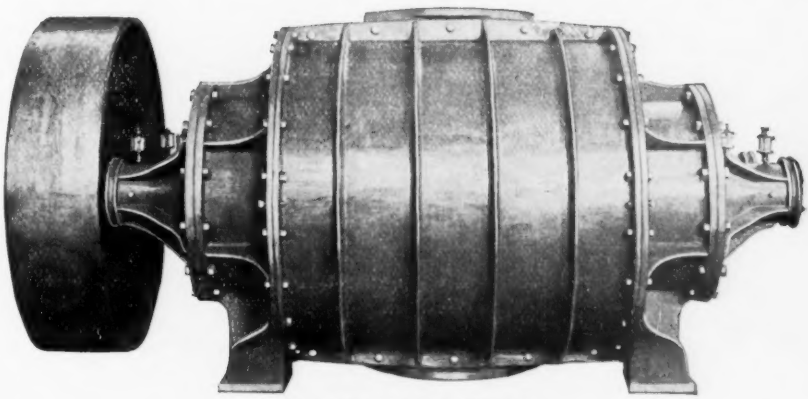
Speed of Pulley Shaft, 125 revolutions.

Weight, 1250 lbs.

For further particulars, write

BARBOUR-STOCKWELL CO., 205 BROADWAY, CAMBRIDGEPORT, Mass.

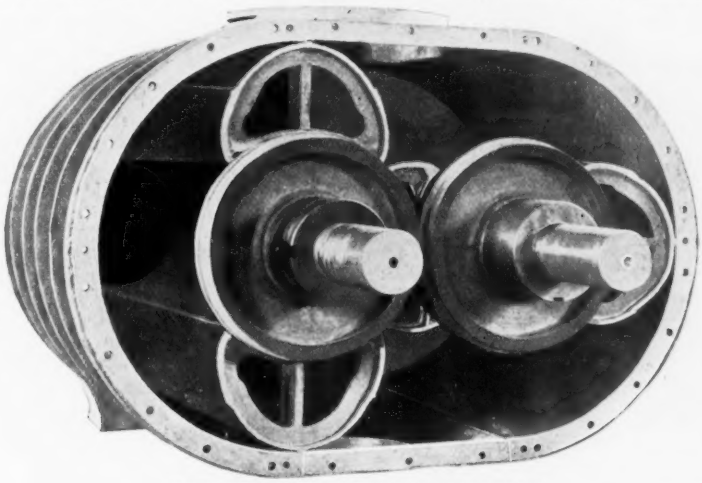
THE GREEN Rotary Pressure Blower



NEW CENTURY PATTERN.

YOU WILL SEE That the working parts are two perfectly balanced impellers mounted on forged steel shafts. They run in bronze bushings, detachable journal bearings and the cut gearing at both ends of the blower is enclosed in oil tight casings.

The Green Blower occupies less space and weighs less than any other Positive Blower in existence.



NEW CENTURY PATTERN—INTERIOR.

Foundry Blowers, High Pressure Blowers, Gas Exhausters, Exhausters for Hot Gases.

THE GREEN GIVES THE MOST VALUE FOR A $.

SEND FOR NEW CATALOGUE B.

Wilbraham Baker Blower Co.,

PHILADELPHIA, PA.

Sales Agents: FRAZER & CHALMERS, Inc., Chicago, Ill. and Branch Houses.

Smooth-On Cements

In up-to-date foundry practice, the time has come when the intelligent use of an iron cement that will withstand fire, water and steam and stay where it is put, has become a shop necessity. A blemish on an iron casting may not injure it, but like a wart on a nose it looks ugly and should be removed. Just here is where Smooth-On Castings is valuable to the manufacturer in saving good castings and to the consumer in avoiding delays in procuring them. Don't use an inferior filling because it is cheap, to do so is neither wise nor economical. Use only the best. Then with an expert, whose good judgment in the use and skill in the application, Smooth-On Castings saves time and money. Smooth-On Castings is useful for many other purposes, daily new uses are being discovered for it.

We make a Smooth-On Compound for Engineers and Steamfitters use, for making connections to withstand high temperatures and high pressures. Unequaled for making Flanged Joints and Boiler Patching.

We also make a special cement for connecting coils, for ammonia machines, for refrigeration. Write for Catalogues and Prices.

SMOOTH-ON MFG. CO.,

VREELAND TOMPKINS, CHEMIST AND MANAGER.

547-549 COMMUNIPAW AVENUE. JERSEY CITY, N. J., U. S. A.

You Can Not Afford to be Without It.

TESTIMONIALS.

Office of the Fulton Iron and Engine Works,
Foundry Department.

Capacity, 10 tons per day. Monarch Bronze in Ingots, Bronze and Brass Castings, Journal Bearings, Babbitt Metals.

Detroit, Mich., July 18th, 1899.

Gentlemen—It gives me pleasure to advise you that the Magnetic Separator you recently installed in our shops is giving us the very best of satisfaction. It does all you claim for it.

Very truly yours,
M. T. Conklin,
Gen. Mgr.

Office of the Great Western Smelting and Refining Co., Smelters, Refiners and dealers in Metals.

Chicago, July 11th, 1899.

Gentlemen—Replying to your favor of the 10th inst., we have found your Separator to be entirely satisfactory

Yours truly,
Gt. Western Smelting & Ref'g Co.

Office of The Ideal Mfg. Co.,
Detroit, Mich., July 29th, 1899.

Gentlemen — Regarding the Noble Electro Magnetic Metal Separator furnished us by your Company. We are very pleased indeed, for the opportunity of stating that it is entirely satisfactory in every respect, and is the most practical and durable machine we have seen for the purpose.

Very respectfully yours,
The Ideal Manufacturing Co.
H. T. Bush.

THIS IS IT.

Don't Turn Down a Good Thing

CONSIDER IT ON ITS MERITS.

The Noble Electro Magnetic Metal Separator, invented by our Supt. Mr. Benj. Noble, was designed for the purpose of separating the Iron from Brass Borings, Turnings, Filings, Emery Grindings, Washings, Skimmings, etc., in fact brass refuse of every description, in order that all the Brass Stock treated by our Separator, can be utilized with absolute safety (free from iron) in the very best grade of castings.

Before attempting to introduce our Separator to the trade, for a period of two years we gave it a most thorough and practical test on Brass Refuse of every description at the Detroit Smelting and Refining Works, and whereas, the machines recently installed by us, were sold practically without any effort or solicitation on our part, and having given entire satisfaction in every instance, we feel justified in placing it on the market as the most practical, reliable and durable device for the purpose intended.

A Dynamo is supplied with our Separator for generating the electricity, but in case you have electricity in your establishment, i. e., a direct current, and not over 110 volts, we can wind electro magnet accordingly, and furnish without Dynamo at a corresponding reduction in price.

The great advantage of our Separator, over the so-called Permanent Magnet Machines on the market today is, that Electro Magnetism being used entirely on our machines, the electric current can be regulated to any desired strength, in accordance with work requiring a weak or strong current, and when not in operation can be cut off entirely, whereas the Permanent Magnet Machines becomes weakened, making them ineffective and unreliable, such being the case with two of the latter machines which we recently replaced with ours.

The Brass Founders' Supply Co.,

MAKERS OF

FLASKS, FURNACES, FOUNDERS' SUPPLIES AND SPECIALTIES.

WRITE FOR OUR
1900

THE IMPROVED RIB, STRAIGHT AND BEVELED AND SPECIAL DESIGNS.

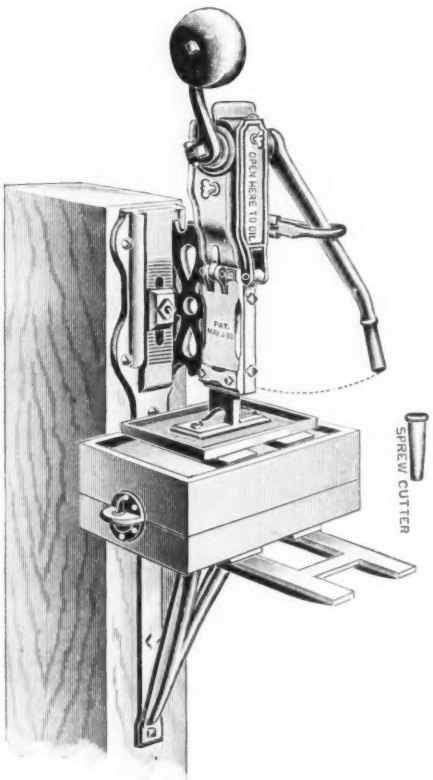
20 PROSPECT ST.,

....NEWARK, N. J.

W. B. BURNS'

Economic Molding Machine

SYRACUSE, N. Y.



The

QUICKEST Adjusted

EASIEST WORKED

and

Most POWERFUL

Machine on the market,

Giving a POSITIVE

UNIFORM Pressure.

No DUST can get to WORKING parts

WHICH ARE ALL ABOVE THE SAND PILE.

MANUFACTURED BY

Syracuse Malleable Iron Works,

SYRACUSE, N. Y.

CORRESPONDENCE SOLICITED.

ROOTS'

BLOWERS

There are Brier ROOTS
Cube ROOTS
Square ROOTS

BUT ONLY ONE

P. H. & F. M. ROOTS

ALWAYS THE STANDARD.
OTHERS IMITATE, BUT NEVER EQUAL.

Forty years' experience boiled down to the most modern *Pressure Blower* in design and workmanship.

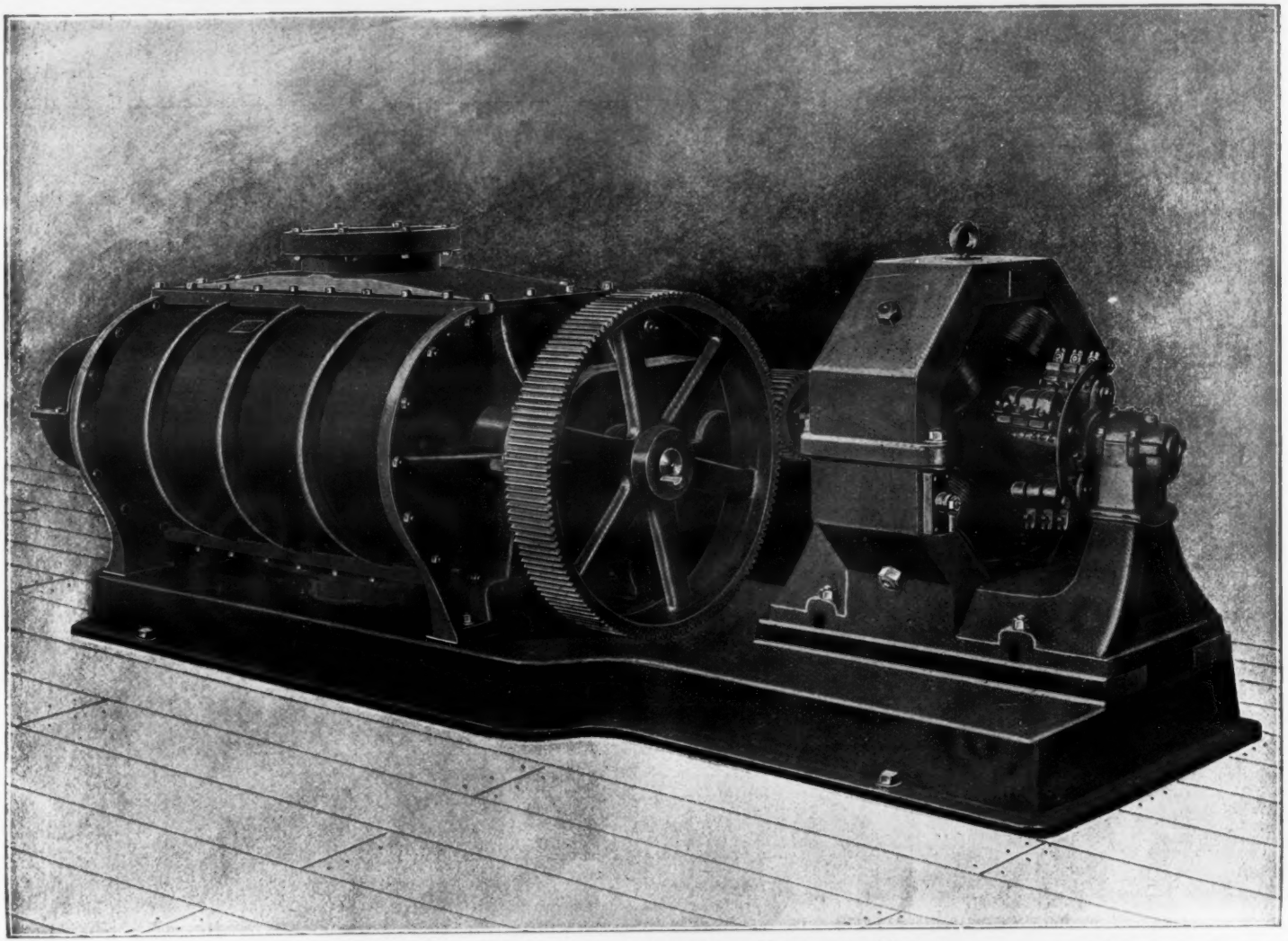
THE ROOTS obtains the *minimum of friction* and the *maximum of efficiency*. Others do not—cannot.

P. H. & F. M. ROOTS CO.,

109 LIBERTY ST., NEW YORK. CONNERSVILLE, IND.

C. H. BRADLEY, JR. & CO.,
Vandergrift Building,
PITTSBURG, PA.

EDMUND A. FORDYCE,
156 Lake Street,
CHICAGO, ILL.



PNEUMATIC TOOLS

SAVES TIME, LABOR AND EXPENSE.

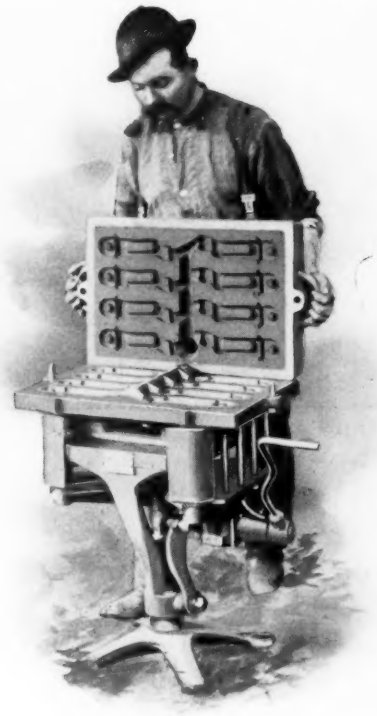
SENT ON 60 DAYS TRIAL.

Chicago Pneumatic Tool Co.,

GENERAL OFFICES:
635 Monadock Block, ...CHICAGO, ILL., U. S. A.

A Practical Molding Machine for Practical Foundrymen.

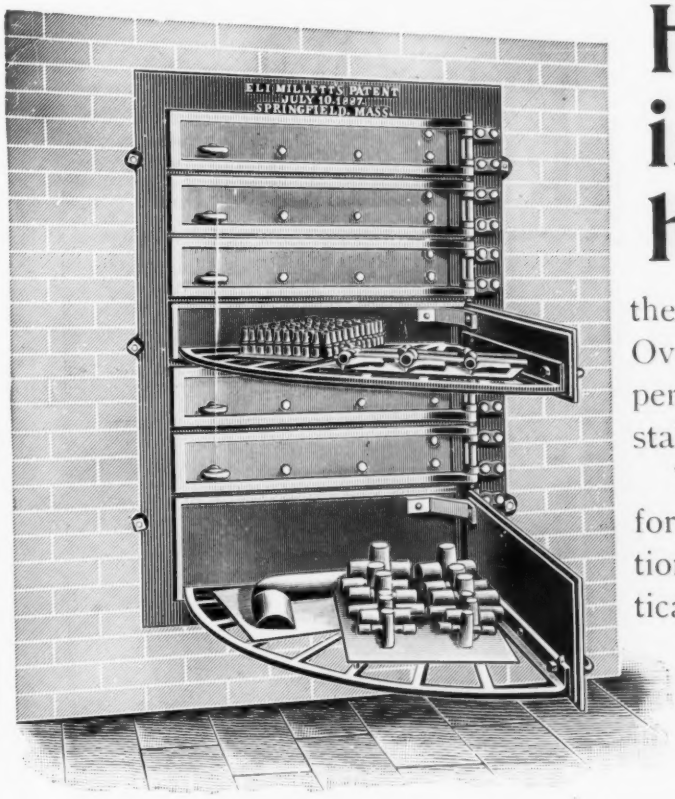
The Weiss Molding Machine is successful because it is built to fit the job made on it. Our illustration shows one of our machines which has more than trebled the output previously obtained by hand work. This is only one example, we have hundreds of others. Such results could not have been obtained by any of the so-called stock machines. Our machine costs a little more in the first place. The gain it makes over other machines, when quantity and quality is considered, makes up for this in a few days. Let us build a machine to fit your job.



Maywood Foundry & Machine Co.,

MAYWOOD, ILL.

Write for our Booklet showing superior points of the Weiss Molding Machine.



Here is how

the Millett Core Oven looks when permanently installed.

This offers a form of construction that is practically indestructible. It makes a core oven that will last more than a lifetime.

There are many Core Ovens, none like the Millett. None that will dry as many cores as well as it will do. A core at any hour of the day, without interfering with the operation of the oven, a feature only found in the Millett.

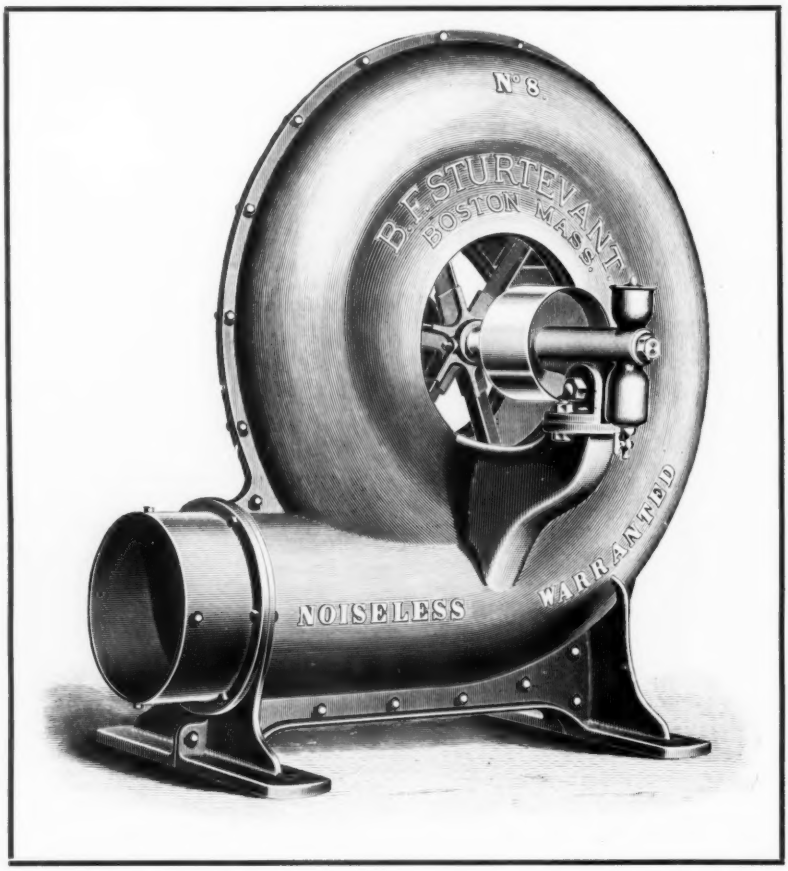
Kindly write for our Core Oven Booklet, it shows prominent concerns at home and abroad who use them.

Millett Core Oven Co.,

BRIGHTWOOD, MASS., U. S. A.

On Exhibition at and for sale by { *THE S. OBERMAYER CO., Cincinnati and Chicago.* / *THE J. W. PAXSON CO., Philadelphia.*

STURTEVANT
FOUNDRY BLOWERS



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59

How it Started.

A foundryman would write us.

About the big claims we were making for the Coburn Trolley Track.

Pretty big claims too.

Hard to believe that such a small thing as a trolley track could make that much difference in the cost of running a shop.

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Trolley track one of the cheapest conveyers you know.

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That is all there is to it.

Then you can hang on to it whatever you want to and move what you like.

Castings, pig iron, coke, sand. Anything that you are now shoving along with a wheelbarrow.

At great cost to yourself.

For men to shove it.

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Slow work to make your big crane get around.

Men don't seem to be working half of the time.

Get a trolley track.

Hang an air hoist thereon.

And your men will hump themselves to keep up with it.

Funny, isn't it?

But true.

That men acquire the same gait as the tools they work with.

Slow tools.

Slow men.

The Coburn Trolley Track is fast.

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Your molders have to jump when they have one overhead.

Can't help it.

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ARE ESPECIALLY DESIGNED FOR CHIPPING CASTINGS.

LIGHT. SIMPLE IN CONSTRUCTION.

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They have an air regulator which can be so adjusted as to admit a minimum amount of air and yet deliver a blow with full force of hammer under various pressures.

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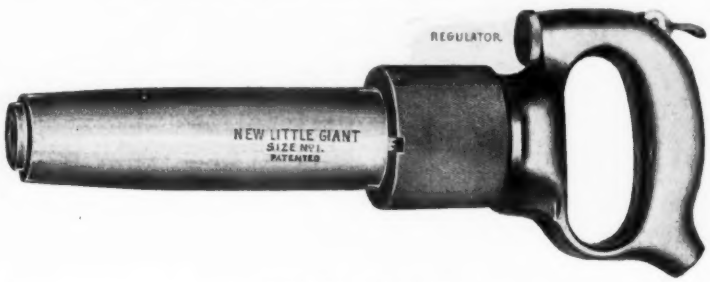

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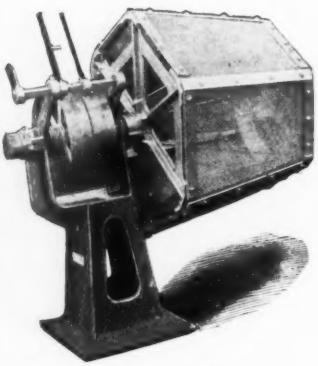

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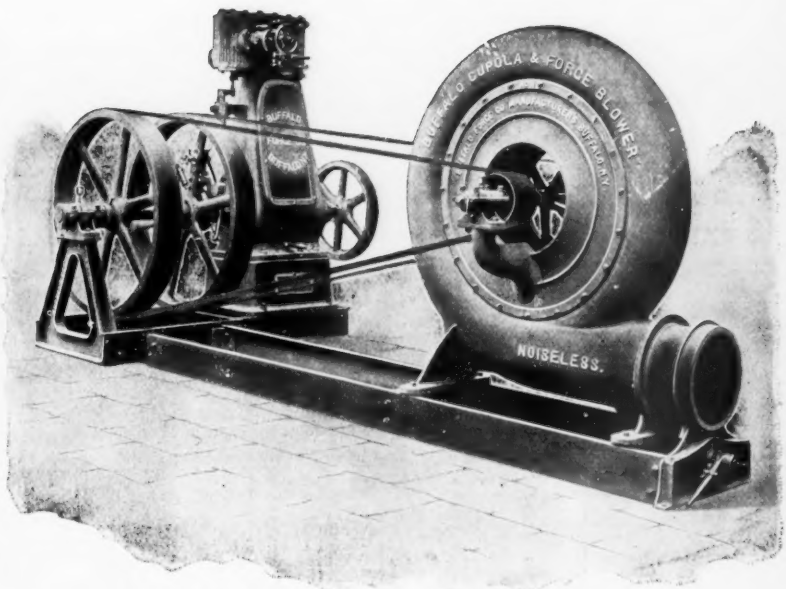

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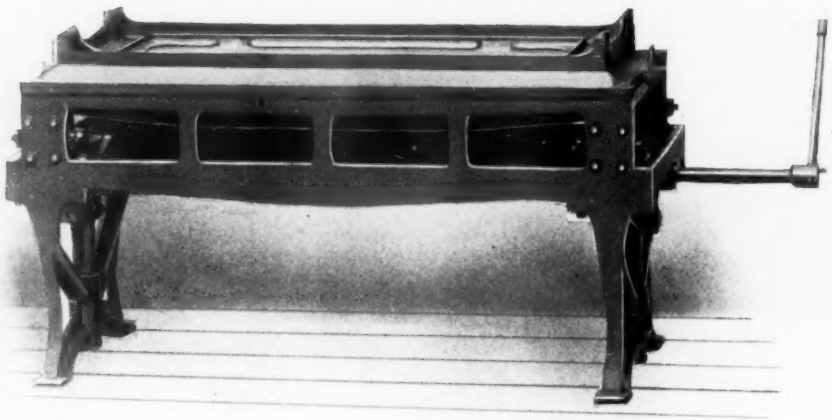

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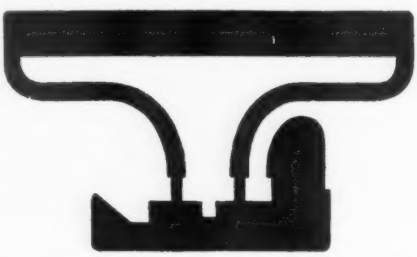

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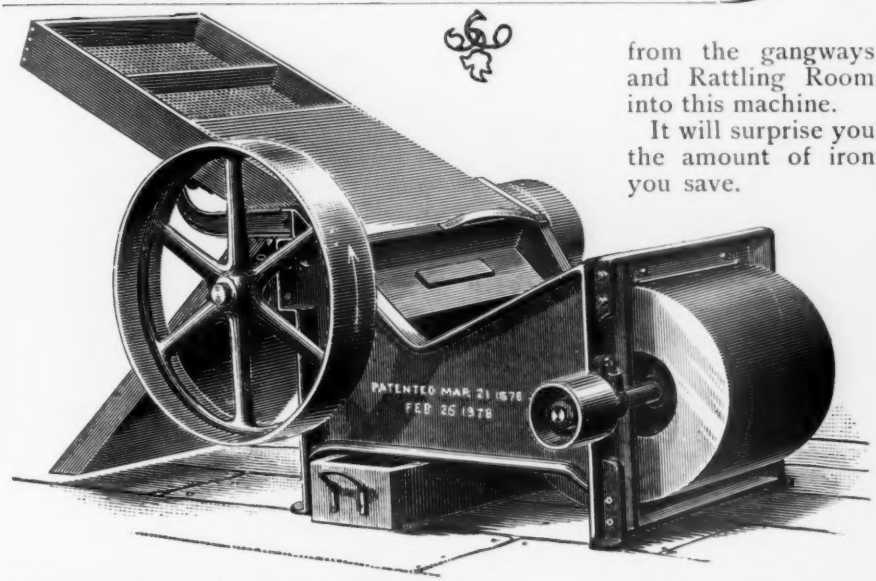

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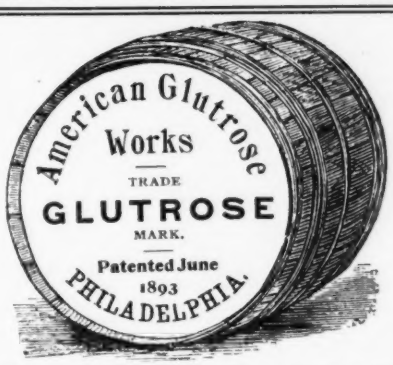

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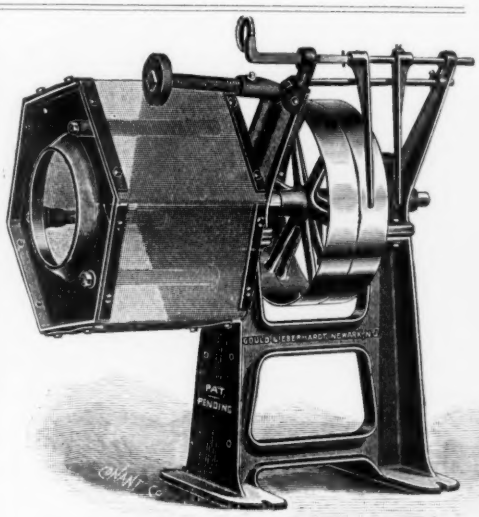

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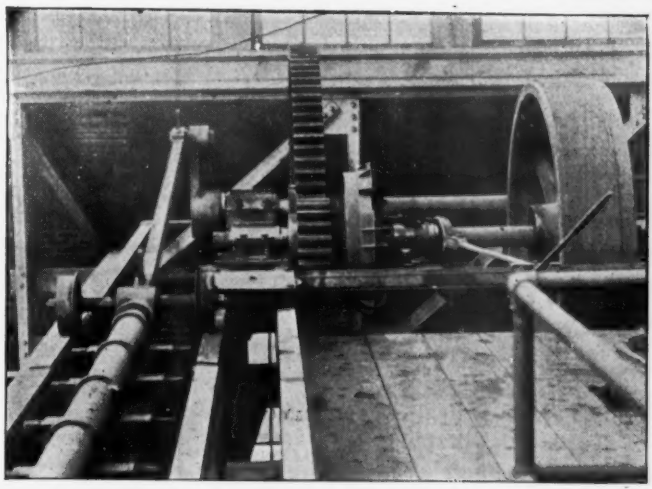

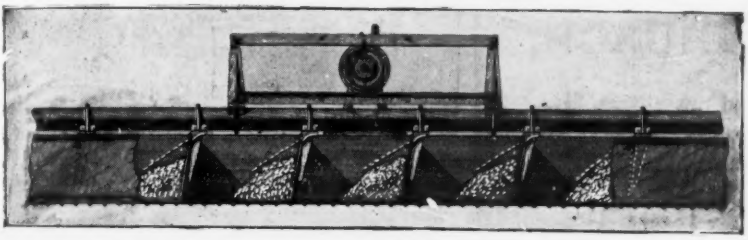

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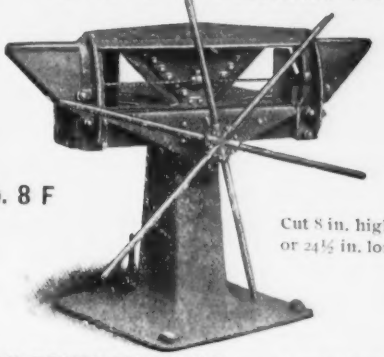

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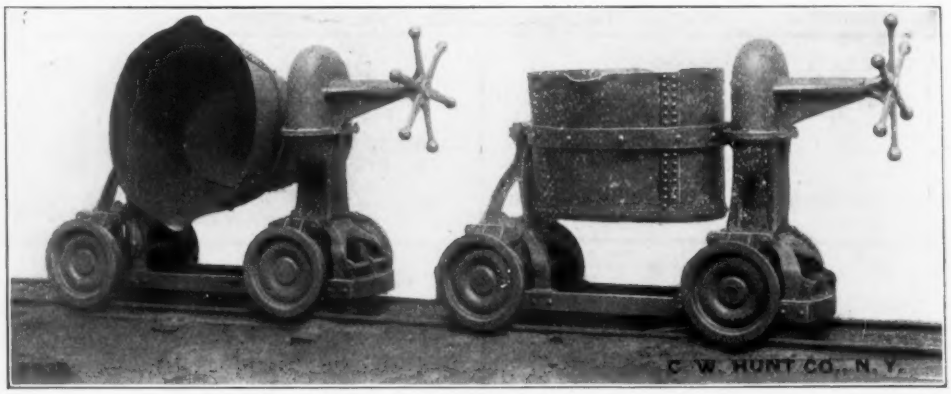


Ladle Cars, 1,500, 2,000, 3,000 Pounds Capacity.

Many foundrymen believe that these cars are not only more convenient to use in distributing molten metal, but are also safer than any overhead system of cranes or tackles. No accident has ever occurred in the use of these cars. The height of the top of the ladle above the rails, when upright, is 26 inches; for convenience in pouring into hand ladles, the shape of the body and the position of the trunnions are arranged so that the spout, when tipped, pours into a ladle 17 inches high. The gear for revolving the ladle, is our patent cam gear, that locks the ladle in every position, and possesses the remarkable feature of having both shafts revolve in the same direction. When the handles are moved, the ladle moves steadily in the same direction as the handles, but only one-twelfth as fast.

Our system of narrow-gauge tracks, switches, curves, turntables, etc., for use in manufacturing establishments and to accommodate such special cars as the above, is worthy of careful investigation by those who are apt to be interested. Catalogue No. 9904 contains useful data, besides thoroughly treating this subject. Copies will be mailed to those interested. Please address the works direct.

C. W. Hunt Company, Brad Street, WEST NEW BRIGHTON, NEW YORK CITY.

ESTABLISHED 1878.

STOW MANUF'G CO.,

BINGHAMTON, N. Y.

INVENTORS OF THE

FLEXIBLE SHAFT

FOR ALL PURPOSES.

The oldest and largest manufacturers in the world

PORTABLE EMERY GRINDER

Take the tool to the work and save heavy handling.

WRITE US FOR CATALOGUE AND PRICES

Dry Sand at all Times

We store enough sand during the dry season to supply our customers during the winter months. Besides storing it, we dry, roll, screen and purify it. You do not have to pay freight on water when you buy your sand, neither do we ask you to accept a lot of foreign matter in our molding sand. We take this out before it leaves us.

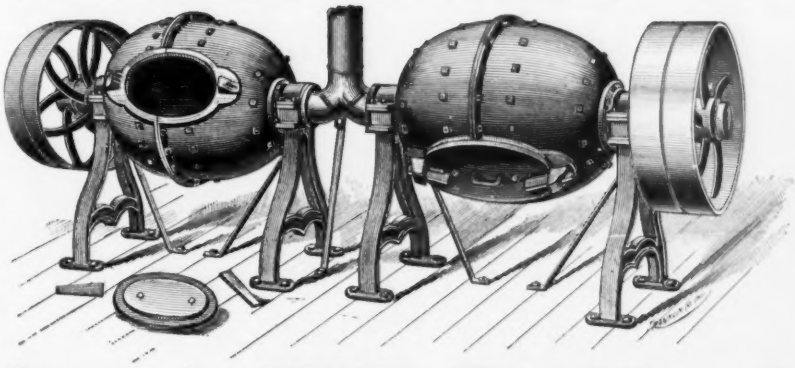
Send for samples and prices, they tell their own story.

Standard Sand Co.,

EVERETT, SUMMIT CO., O.

THE GARDEN CITY SAND CO.,

Western Agents, - - Chicago, Ill.



A Fine Pair

Stover's IMPROVED EXHAUST Tumbling Barrels

The Stover Egg Shaped Barrel does double the work of any other with less noise and power. It gives the contents a double motion or action—from ends to center and from side to center—causing a thorough mixing and rubbing together of all the parts contained therein, cleaning and polishing the contents better and quicker than any other form of barrel.

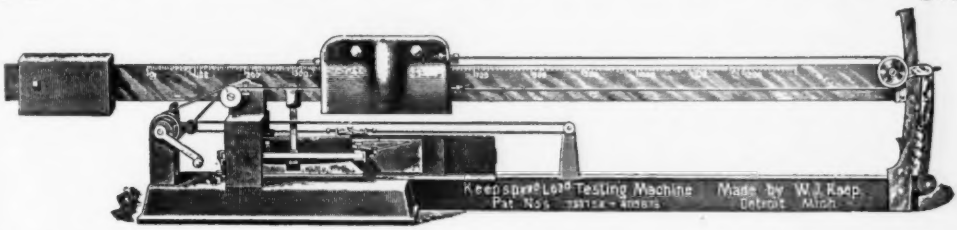
Sent on 30 days approval to any responsible manufacturer of light castings, malleable iron wire nails, or any other small articles that require cleaning and polishing.

For full particulars, address,

Stover Manufacturing Co.

205 RIVER STREET, FREEPORT, ILL

MECHANICAL ANALYSIS



The Only Practical Method for . . . . MAKING CASTINGS

OF A DESIRED QUALITY

AT A LOW PRICE.

Send for Testimonials and for Description of

W. J. KEEP, Detroit, Mich.

KEEP'S TEST APPARATUS.

MOLDING MACHINES

Suited to Any Condition.

The cost of patterns often eclipses the cost of Molding Machines.

The sun of economy always shows our methods in strong light.

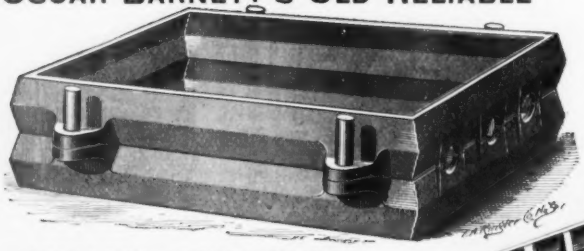
THE TABOR MFG. CO.
ELIZABETH, N. J.

L. D. PHONE 1045. Our Own Foundry Insures Prompt Shipments. FOUNDED IN "45."

Soft, Smooth Castings and Finished Hardware Specialties to Order.

Hardwood Bench Rammers, 35c PER PAIR F. O. B. Newark.

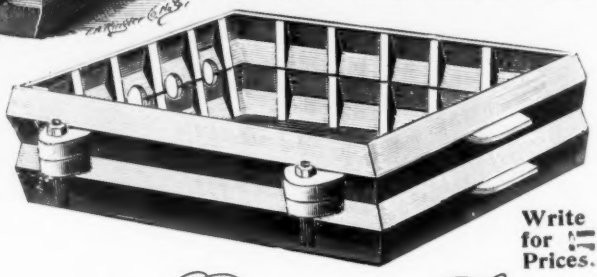
OSCAR BARNETT'S OLD RELIABLE



Ribs in Flasks increase weight and obstruct ramming—two important features. Do you want them? You are the Doctor.

SAME PRICE AS <STANDARD> BEVEL.

DEMAREST PATENT RIBBED, 1855.



<STANDARD> BEVEL FLASK.

All Faces Level, Accurately Assembled, Guaranteed to Interchange Perfectly. Not Bored from Worn Flasks, but Hardened Steel Bushed Templets. Pins, Steel, 1-1000ths of an inch.

BRASS FOUNDRY SUPPLIES.

Write for Prices.

Oscar Barnett Foundry Co.,

NEWARK, N. J., U. S. A.

U.S. TIN

is used in making brass and bronze castings; it makes a superior metal, sounder castings, more homogeneous in structure, richer color, better wearing metal, of higher surface lustre than alloy made with imported tin. U. S. TIN is to be used in same proportions as imported tin.

The Price is Much Lower.

The difference in price, the superiority of metal, and sounder castings should induce all users of metals to make comparative tests. We will send to responsible parties small lots of the U. S. TIN on approval, and if satisfactory, will make contracts covering a given time. Shall be pleased to correspond with all who may be interested.

THE AJAX METAL COMPANY, PHILADELPHIA, PA.

CRUCIBLES.

WE SAID THEY WERE "BEST IN QUALITY."

Four of the Largest Consumers in the West, say:—

About No. 150. During the past three months Hussman averaged 13, 16⅝, and 17¾ heats, ———'s 7⅞, 10⅝ and 11.

About No. 80. We get 17 to 18 heats with Oil Fuel—could never get over 5 with ———'s special make.

About No. 70. The Hussman Crucible gave us FIVE TIMES the number of heats obtainable from either ———'s or ———'s.

About No. 25. The Hussman gave 42 to 45 heats (4 heats per day) ———'s never gave over 30.

HUSSMAN CRUCIBLE CO.

1326 MONADNOCK BLOCK.

CHICAGO, ILL.

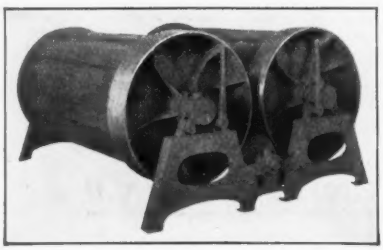
Carborundum Saves Money by making it Easier to Earn Money.

Piece workers like Carborundum Wheels because Carborundum cuts faster—does more work in a day; lasts longer—doesn't need to be changed so often; wears more evenly—doesn't need dressing so often; finishes the work better—gives better satisfaction all around.

And the wheel that puts money into the pocket of the piece worker, also puts money into the pocket of the manufacturer.

Ask us for proof of Carborundum goodness.

The Carborundum Company, Niagara Falls, N. Y.



TUMBLING BARRELS

We have some improved designs we would like to tell you more about by correspondence. Nothing weak or light about these machines. 18″, 24″, 30″, 36″, 42″ diameters by any length for any service.

NORTHERN ENGINEERING WORKS,
MANUFACTURERS,
4 CHENE ST., DETROIT, MICH.

CINCINNATI HAMILTON & DAYTON RY.
CH&D
CINCINNATI
INDIANAPOLIS CHICAGO DAYTON TOLEDO DETROIT

THE MICHIGAN LINE

THE ONLY DIRECT LINE BETWEEN

CINCINNATI, DAYTON, TOLEDO, DETROIT, MICHIGAN AND EASTERN CITIES.

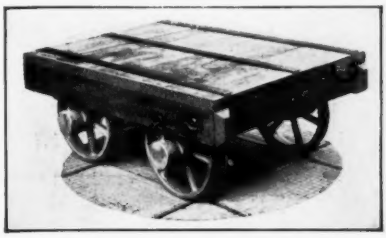
3 DAILY TRAINS FROM DETROIT CONNECTING AT CINCINNATI FOR

FLORIDA, NEW ORLEANS, CALIFORNIA
and all Southern Winter Resorts.

FINEST TRAIN SERVICE.

For detail information inquire of nearest representative or address

D. G. EDWARDS,
Passenger Traffic Manager, Cincinnati, O.



SHOP TRUCKS

TURNTABLES AND TRAMWAY EQUIPMENT.

Malleable iron and other foundry plants can reduce costs in handling material by introducing our shop tramway equipment. High grade, practical and substantial.

Send us your wants.

NORTHERN ENGINEERING WORKS,
MANUFACTURERS,
4 CHENE ST., DETROIT, MICH.

STEAM
CRANES
ELECTRIC
BELT & HAND
POWER
HOISTING APPLIANCES.
CAGE
MANF'G. CO.
COLUMBUS, O.

to see a foundryman trying to make his own chaplets.

He can't make them as good as we can.

He can't make them at one-half the cost.

Our catalogue and price list will prove this.

We will also send some samples if you will ask for them.

In doing so we will thank you to state the kind of work you are doing.

We make chaplets to fit that work.

... THE ...

Fanner Mfg. Co.,

Brookside Park,

CLEVELAND, OHIO.

Stove Trimmings, Stove Scrapers, Stove Rods, Stove Bolts.

Quality first-class and prompt shipment guaranteed. Catalogue and prices furnished on application.

DON'T CHIP

By the old

Hand Method

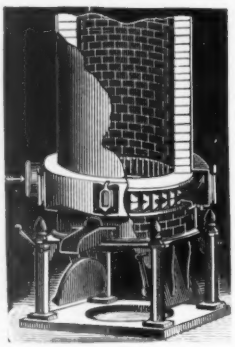
when you can do the work in one-fourth the time with our ***PNEUMATIC HAMMERS.*** It has the simplest valve yet designed and hence the least likely to get out of order. It cannot break or become inoperative through slight wear, and you can oil it throughout in an instant.

See last month's "Foundry" for details regarding our PNEUMATIC RAMMER.

PHILADELPHIA PNEUMATIC TOOL CO.,

PHILADELPHIA,	NEW YORK,	BOSTON,	PITTSBURGH,
21 So. 12th Street,	149 Broadway.	Exchange Building.	Wood and Water Sts.

When You Buy a Cupola



YOU buy it for the work it will do and not for any fancy arrangement the maker may see fit to attach thereto. There is nothing fancy about the **Blakeney Cupola.** It is built to melt iron in the most economical manner. It is made of as few parts as possible.

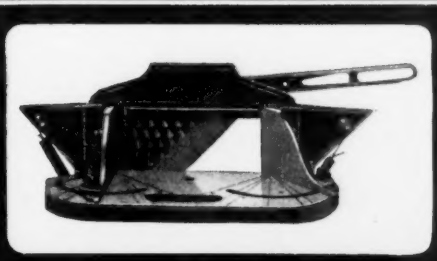
Did you ever notice that most of the cupolas made with two rows of tuyeres are operated with the upper row blocked up? Ask the foundryman why he does not use the upper row and he will tell you that they do no good and that the lining is cut away by their use.

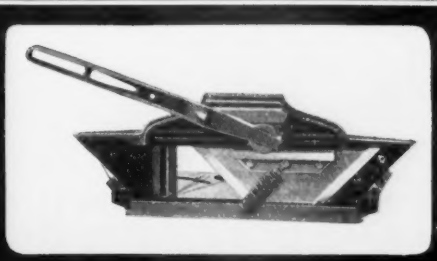
What is sought in a cupola is an even distribution of the blast. The more evenly the air is distributed the more even will be the melting and the more economical the whole operation.

The **Blakeney Cupola** is the only type of cupola that distributes the blast uniformly. A glance at the illustration of the tuyere of this cupola will show that no other arrangement can approach it in uniformity of distribution.

We can supply these cupolas on short notice, and shall be glad to quote you prices if you will write us, stating the amount of iron you are melting or intend to melt.

The Springfield Cupola Co., SPRINGFIELD, OHIO, U. S. A.





OLIVER WOOD TRIMMERS SAVE MONEY ON PATTERNS

If you desire to produce perfect patterns at the lowest possible cost, you must use a large Oliver Wood Trimmer in your pattern shop. You must also have a small Oliver Wood Trimmer on each pattern maker's bench for his exclusive use. This No. 0 style was designed especially for this latter use.

Note the solid knife. It is twice as easy to sharpen as any other style because no screws have to be removed.

Note the large range of angles that can be trimmed—just double that of any other bench style.

Note the position of gear and rack. No dirt and chips can get in there.

There are so many different styles and so many good points in each that you had better let us explain all. Our Oliver Wood Trimmer book does this and it is free.

Liebers Code Used. Cable Address, "Trimmer."

AMERICAN MACHINERY CO. GRAND RAPIDS, MICH.

CORNELL'S CORE COMPOUND

40 FOUNDRIES

ARE NOW USING

Cornell's Core Compound

IF you want to be ***in the swim*** and ***up-to-date*** send in an order for a free sample or a barrel.

Prices and full directions on application

J. B. & J. M. CORNELL,

26TH STREET AND 11TH AVENUE, NEW YORK CITY

HONEST ADVERTISING

DEMANDS THAT A JOURNAL SHOULD TREAT EVERY ADVERTISER ALIKE. . . .

THE FOUNDRY

HAS BUT ONE RATE. NO REDUCTION TO ADVERTISING AGENCIES. . .

Full Page, per month,	*$25.00*
Half " "	*15.00*
Quarter Page, "	*8.50*

ALBANY
Molding Sand

CAN'T BE BEAT FOR FINENESS
AND LASTING QUALITIES.

NORTH RIVER SAND

MEDIUM AND COARSE GRADES,
STRONG, PLENTY OF BODY.

RAIL OR WATER SHIPMENT

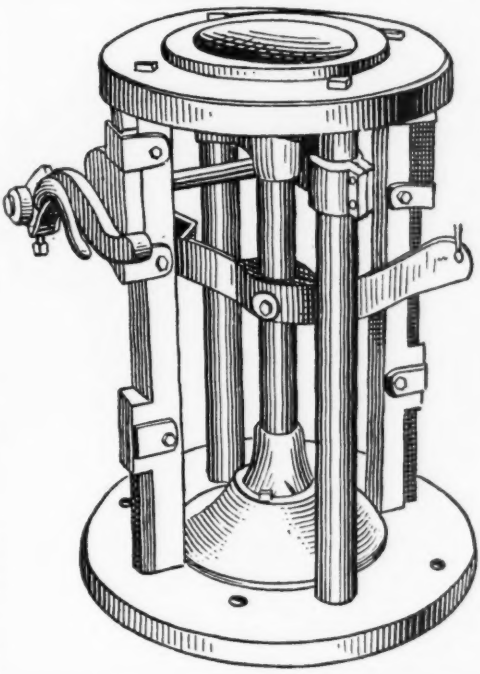
TAKE YOUR CHOICE.

Prices Reasonable. Quality of Goods, The Highest.

CEYLON LEAD, FACINGS, SUPPLIES, ETC.

Albany & North River Sand Co.

ALBANY, N. Y.



HERMANN

Molding Machine.

Hand Ramming Reduced 95 per cent.

This machine is especially valuable for deep work—and prevents swells in the castings.

SEND FOR PARTICULARS AND PRICES.

J. S. McCORMICK COMPANY,

PITTSBURG, PA,

A GOOD THING!

That's what you are missing when you fail to use **"DOME" FIRE CLAY.** One Steel Manufacturing Company has used *fifty carloads since January 1st, 1899;* another formerly used the highest grade of Pennsylvania Clay and is now using **"DOME" CLAY** *exclusively;* and so on.

Let us send you a *free sample for test,* and put you in the way of saving over 100 per cent. on your Clay bills, *sure.*

Our Cupola Blocks, Fire Brick, Molding Sand, Fire Sand, etc., are of the most substantial kind.

Our References—any Leading Manufacturer in the Northwest. *Write us!*

GARDEN CITY SAND CO.,

LONG DISTANCE PHONE, M 5102.

188 Madison Street, CHICAGO.

The Statistics

heretofore published of the wonderful expansion of the iron industry during the past decades have been of great interest. We venture to hope that the following figures showing the increase in the volume of our business will be read with pleasure by our friends who have dealt with us and to whom we are indebted for our success.

Our organization has been enlarged and strengthened to meet the increasing demands and our representatives are in constant touch with every iron producing and consuming district in the country. If there are any buyers of pig iron or coke who have not yet given us an opportunity to care for their needs, they are most cordially invited to place a contract and test our ability to satisfy them.

Sales of Pig Iron, Gross Tons.

1881—45,647

1885—101,279

1890—327,601

1895—585,874

1896—659,416

1897—775,345

1898—1,001,356

1899—1,455,093

The official statistics give the production of pig iron in 1899:

Bessemer,	8,202,778	tons.
Basic,	985,033	"
Foundry and Forge,	4,432,892	"
Total,	13,620,703	"

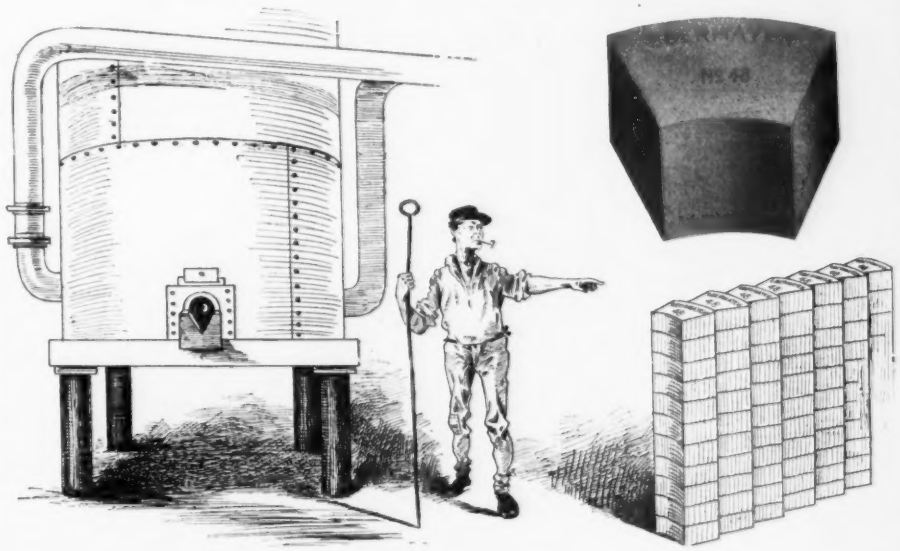
It will be noticed that our sales were equal to about one-third the entire amount of iron made for Foundry and Rolling Mill use.

1899, Sales of Coke and other material, 444,588 tons.

1899, TOTAL SALES Pig Iron, Coke, etc., 1,899,681 tons.

Rogers, Brown & Co.,

Cincinnati **New York** **Chicago** **Buffalo** **Philadelphia**
Pittsburg **Cleveland** **Boston** **St. Louis** **Birmingham**



SAYS TIM FLINN

"Begob an' if I'm iny judge, thim are the brick that'l save me some wurrk lining all the toime."

If our Obermayer Blocks (size 12x6x6) can save Tim work, then the same reason would apply for their saving you money.

We quoted a foundry a few weeks ago on these Blocks and learned that our price was double that at which they had last purchased. These same people admitted that what they first bought stood the fire but a short time.

Watch the next issue of THE FOUNDRY for the mathematical way we prove our Blocks cheaper.

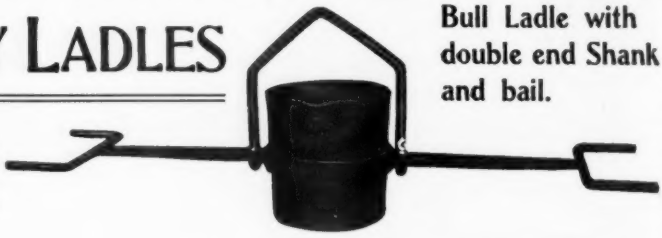
We make anything in Fire Brick and we furnish the patterns.

THE S. OBERMAYER CO.,

CINCINNATI. CHICAGO.

FOUNDRY LADLES

We sell all sizes from 30lb. capacity Hand Ladle to 15 ton Crane Ladle.



Bull Ladle with double end Shank and bail.

We are in position to fill ***any size order*** for Hand Ladles or Bull Ladles from 30 to 500 lb. capacity, either bowls, shanks or bails, from our ***stock.***

CRANE LADLES WITH WORM GEAR.

Every Crane Ladle tested with full load before leaving our works. We can furnish Crane Ladles with either Spur or Worm gear.

CRANE TRUCK LADLES.

Can be used for either Crane or Truck Ladle. Construction of standards on truck are such that ladle is easily removed.

Special Ladles of every description made to order on short notice. ***Crane Ladles up to 10,000 lb. capacity shipped from our stock. We have them on hand ready for shipment.*** Send your orders to us.

EQUIPMENT DEPARTMENT

THE S. OBERMAYER CO.

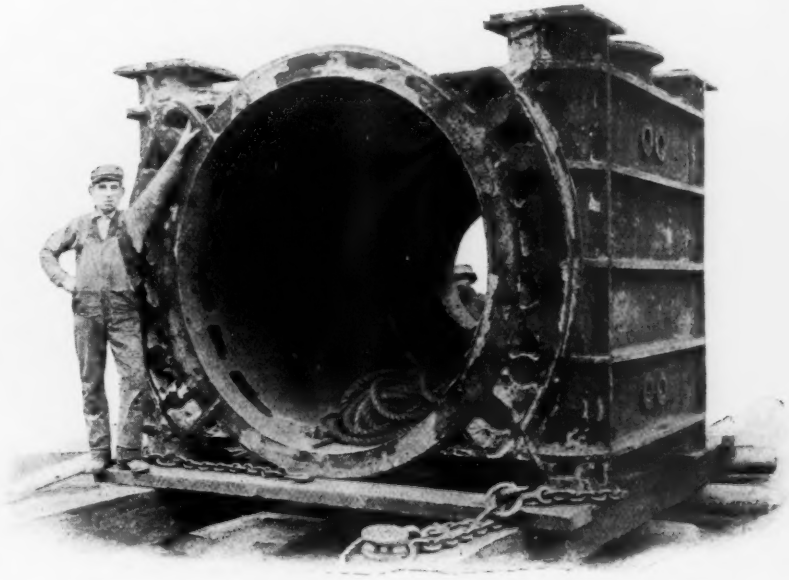
CINCINNATI, OHIO. CHICAGO, ILL.

78 x 60 IN. CORLISS

Low Pressure Steam Cylinder

WEIGHT 44,212 POUNDS.

Just as raised from pit before cleaning.



WHO CAN BEAT THIS?

MADE IN

Lumberton Molding Sand and Millville Gravel with Blacking

FURNISHED BY THE

J. W. Paxson Co., PHILADELPHIA, PA.

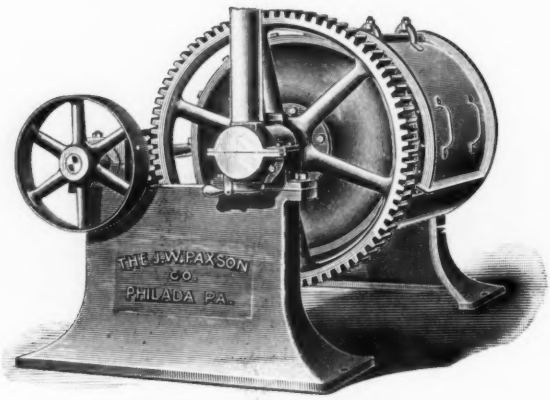
CASTING MADE BY

The Harlan & Hollingsworth Co.,

WILMINGTON, DEL.

Paxson Exhaust Rumblers

MADE OF STEEL.



MADE IN SIZES:

18	inch	diameter,	any	length	from	24	inch to	48 inch.
24	"	"	"	"		30	"	48 "
30	"	"	"	"		36	"	54 "
36	"	"	"	"		36	"	54 "
40	"	"	"	"		36	"	60 "

No Cast Iron Staves

BUT

One Solid Sheet of Steel.

Wide Door Extends Full Length of Mill.
Ribs on Inside to Keep Castings from Slipping.

We have lately installed a large gang of them in the works of the General Electric Company, Schenectady, N. Y., where they are run by electric motors.

These are the best and most economical Rumblers ever made.

J. W. Paxson Co., 1021 North Delaware Avenue, PHILADELPHIA, PA., U. S. A.

NEW

Paxson-Colliau Cupola

The more you examine it, the better you will like it . . . . . .

The Acme of Science in Cupola Construction . .

All that was Best in the old Colliau Cupola, with Every Improvement suggested by long experience added.

LOCATION AND AREA OF TUYERES INSURE THE HIGHEST MELTING . . . EFFICIENCY. . . . . .

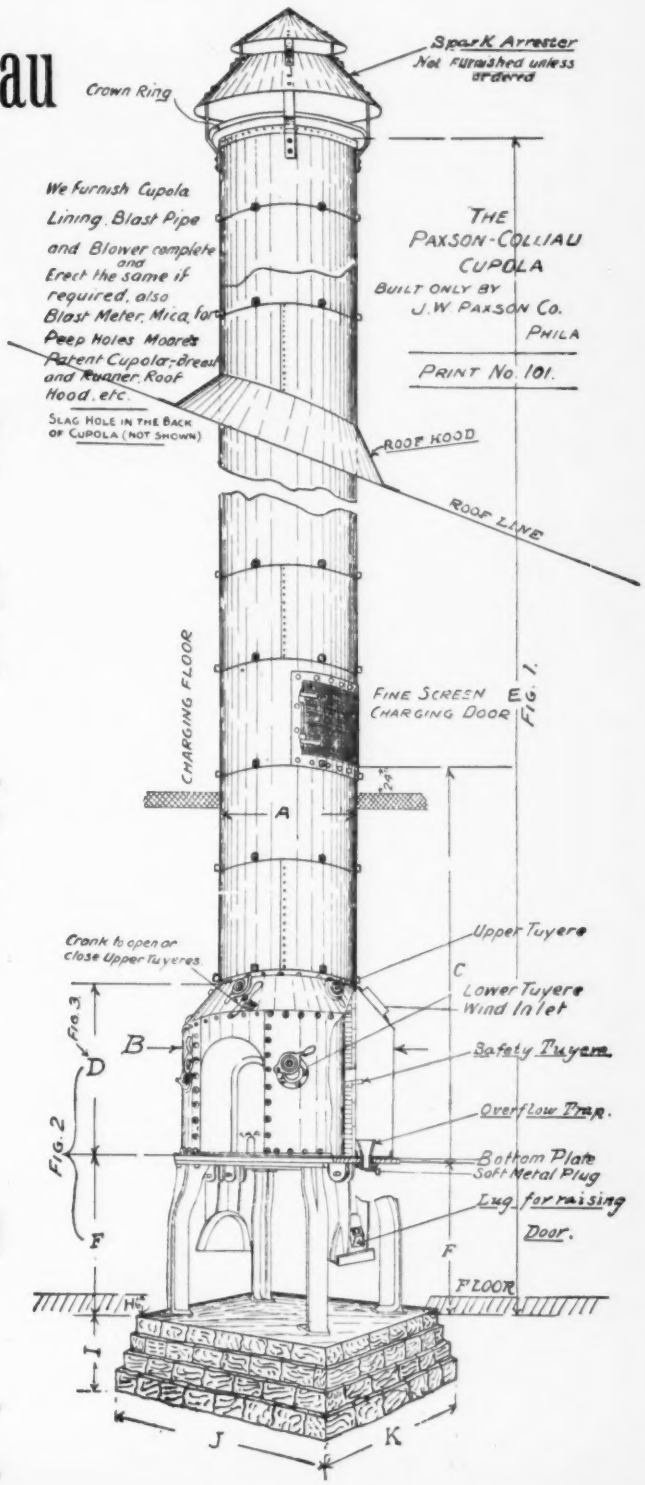
It keeps us hustling to fill the orders for these goods.

MADE ONLY BY THE

J.W. Paxson Co.

1021 . . .
North Delaware Avenue,

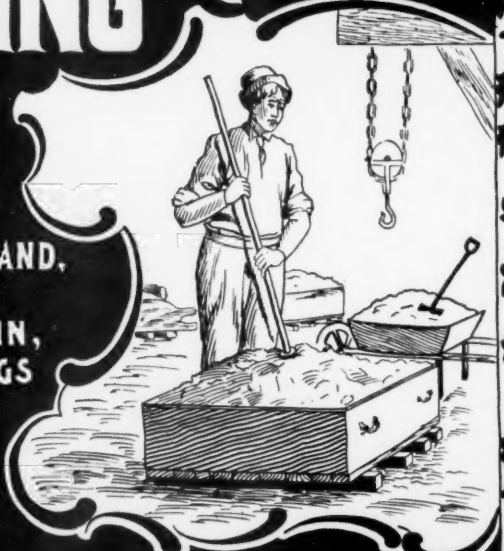
PHILADELPHIA, PA., U. S. A.



WHITEHEAD BROTHERS COMPANY.

MOLDING SAND

FIRE SAND,
PHILADELPHIA SAND,
FRENCH SAND,
FIRE CLAY KAOLIN,
FOUNDRY FACINGS
AND SUPPLIES
OF ALL KINDS.
LEAD FACINGS
A SPECIALTY.



ALBANY SAND FOR BRASS AND STOVE PLATE CASTINGS

527-39 WEST 27TH. ST.
NEW YORK.

PROVIDENCE OFFICE.
42 S. WATER ST.

BUFFALO OFFICE.
70 AND 72 COLUMBIA ST.

WORKS AT

CHEESEQUAKE CREEK, N. J.
SOUTH RIVER, N. J.
RARITON RIVER, N. J.
SOUTH AMBOY, N. J.
WAREHAM, MASS.
CENTRE ISLAND, L.I.
WATERFORD, N.Y.
ALBANY, N.Y.
CEDAR HILL, N.Y.
COXSACKIE, N.Y.
CLINTON POINT, N.Y.
ATHENS, N.Y.
COEYMANS, N.Y.
WILLOW SPRINGS, N.Y.
POUGHKEEPSIE, N.Y.
CRESCENT, N.Y.

THIS CUT shows the appearance of a Dixon Crucible after running 34 heats on severe brass work. It was used in one of the best equipped brass foundries in the country. The brass molder pronounced it AA1—ideal in behavior and results. We do not show this as a record breaker, because it isn't. It's just a sample of a regular Dixon Crucible—one that gives its user full value, wearing down gradually until on its 35th heat it cracked on the rim under pressure of the tongs. Next month we will show you how it looked on the inside.

Joseph Dixon Crucible Co.,

JERSEY CITY, N. J.

By using our

Corona Plumbago

for medium weight castings, and our

X Plumbago

PURE CEYLON SILVER LEAD

for your heaviest and hottest poured castings, you can turn out the most perfect green sand work at the minimum cost for facings

The Cleveland Facing Mill Co.

FRANK H. CHAMBERLIN, Propr.

CLEVELAND, OHIO

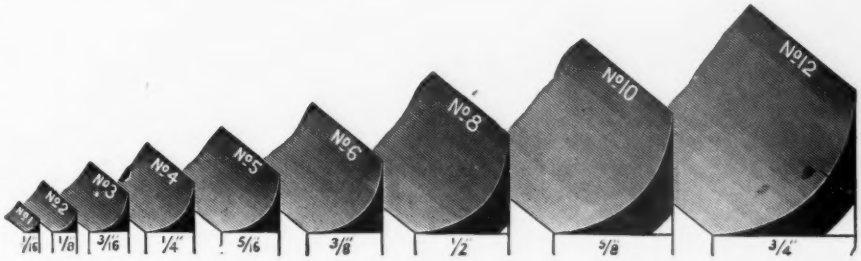
By using our

C. F. M. Founders' Perfect Wash

for your skin dried, loam or dry sand work, you turn out castings that are the envy of your competitors

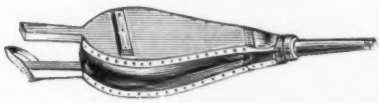
A FEW

FOUNDRY SUPPLIES



LEATHER PATTERN FILLETS.

Every foot guaranteed.



FOUNDRY BELLOWS.

Hand made, air tight, nine, ten, eleven and twelve inches.

PERFECTION CORE BOX.

Made of hard maple.

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The Cleveland Facing Mill Co.,

FRANK H. CRAMBERLIN, PROPRIETOR. CLEVELAND, OHIO.

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WASHINGTON COAL & COKE CO.

CAPITAL, PAID UP, $500,000.

3500 Acres of Coal. **5000 Tons Daily Capacity.**

350 COAL AND COKE CARS — 500 COKE OVENS.

Foundry Coke Our Specialty.

GENERAL OFFICE—
DAWSON, FAYETTE CO., PA.

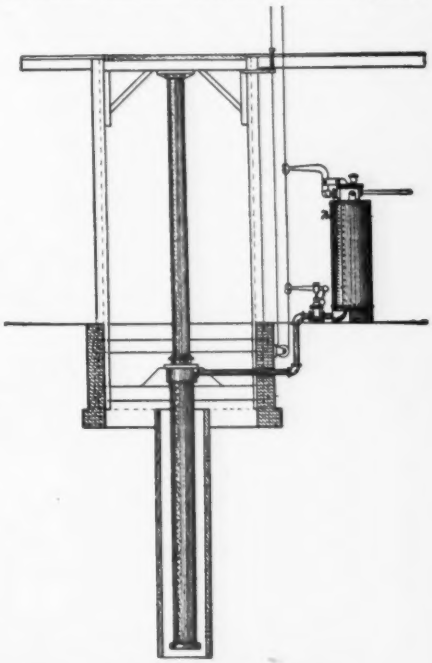
SALES OFFICE—PITTSBURG, PA.
N. P. HYNDMAN, SALES AGENT.

60 Per Cent. Ain't Bad.

Yet this is what the Ridgeway Steam Hydraulic Elevator saves in steam over the pump driven hydraulic.

Yes, it certainly is a big saving. Do you believe it?

We didn't until it was tested. We knew we had the nicest working elevator ever designed and were content to say, from general observation, that it would use no more steam than a pump hydraulic and had the advantage of not costing so much to buy and to keep in repair.



But it occurred to an engineer to get a barrel of water and a platform scale and go to weighing the steam used by the Steam Hydraulic and also of the steam used by Pump Hydraulic and to compare results.

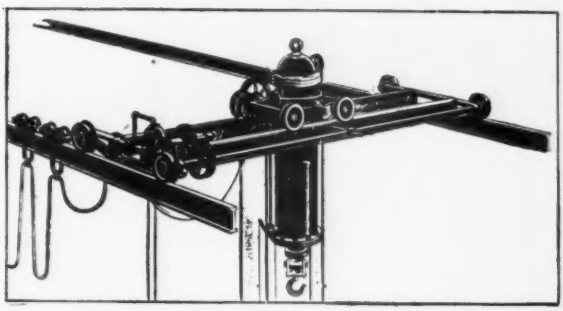
The result was a surprise party for everybody. The steam hydraulic showed a wonderful efficiency, using as little as 60 per cent. less steam than the pump to lift the same load. Of course everybody knows the pump is a wasteful machine, but who would guess the Steam Hydraulic to be any more economical?

Why is it? Oh dear, don't ask us; have no time or space to go into the why and wherefores. People are finding out the fact fast enough and demanding elevators as fast as we can build them. Too busy to fuss about why and wherefores. We have a little booklet of tests if you want it.

The only thing for you is that if you need an elevator for taking up stock to cupolas, steel furnaces or any other like hoisting you should get prices and particulars. The best concerns everywhere are getting these elevators.

HYDRAULIC AIR HOISTS.

Our patent oil controlling devise is now being used for all sorts of cylinders so that air and steam can be used for many purposes in safety instead of the costly draulic. We solicit correspondence with engineers and others. Our facilities for supplying bored cylinders are the very best and our cylinders are perfect.



The Steam Hydraulic Crane is one of the Old Reliable Staples Now.

CRAIG RIDGWAY & SON CO., COATESVILLE, PA.

EUROPEAN AGENT,

CHAS. G. ECKSTEIN, 16 Spandaurster., Berlin, Germany.

William Sellers & Co., Incorp.

PHILADELPHIA, PA.

Foundry Machinery.

Every Foundryman knows to his cost that machinery exposed to the dust, dirt and heat of a foundry, is subjected to very severe conditions of service, and unless it is properly designed "to stand the racket" will rapidly wear out.

Having operated Foundries in connection with our Machine Tool Works for half a century, we have had abundant opportunity to study this question in all its phases, both from the theoretical standpoint of the designer of such machinery, and from the practical standpoint of the user.

All of the labor saving appliances intended for use in Foundries, which we advertise in "THE FOUNDRY," and elsewhere, were designed primarily for our own use, and their good qualities were thoroughly tested by us in our own Foundries before offering them to the public.

We make **Foundry Jib Cranes** of iron frame work instead of wood, and without struts, thus being entirely clear of obstructions underneath. They are operated by electricity, steam, or other power, and have rapid motion in hoisting the load and in swinging.

We make **Traveling Cranes** which will lift the copes of the longest molds **absolutely vertically** and without jarring the sand. We make Cranes that lift the largest castings and transport them to any portion of the floor very expeditiously. The most perfect safety devices have been invented and applied to these Cranes, so that the load can never lower except at the will of the operator. All parts of the machinery are conveniently located for oiling, and for making necessary renewals or repairs.

Last, but not least, we make a **Centrifugal Sand Mixing Machine** which has literally worked a revolution in the method of preparing facing sand, molding sand and core sand in foundries wherever it has been introduced. Last month "THE FOUNDRY" contained a list of a few of the recent purchasers of this remarkable labor saver in mixing sand, as well as improver of molding sand.

To those who are sufficiently interested in what we have here said to wish to know more, we will be pleased to send on application, illustrated booklets describing our jib and traveling Cranes and Centrifugal Sand Mixing Machine.

Over 15,000 in Use.

ALWAYS READY!

800 TO 2000 CANDLE POWER.

ESPECIALLY ADAPTED FOR

FOUNDRIES

PORTABLE, SELF-CONTAINED AUTOMATIC.

NO SMOKE! NO SPRAY! NO SHARP SHADOWS!

Now in Valuable Use With Hundreds of Foundries,

In addition to 400 Railroads and over 500 Contractors.

ROSS MEEHAN FOUNDRY CO.
CHATTANOOGA, TENN., May 5, 1896.

The Wells Light M'f'g. Co., Nos. 44 and 46 Washington St., New York City:

GENTLEMEN—It is contrary to our rule to give testimonials, but an article with the merit of your Wells Light deserves to be made an exception. We have used your lights for the past five years, and consider them indispensable to us.

Yours very truly,
ROSS-MEEHAN FOUNDRY CO.
P. A. BRAWNER, JR., Sec'y, & Treas.

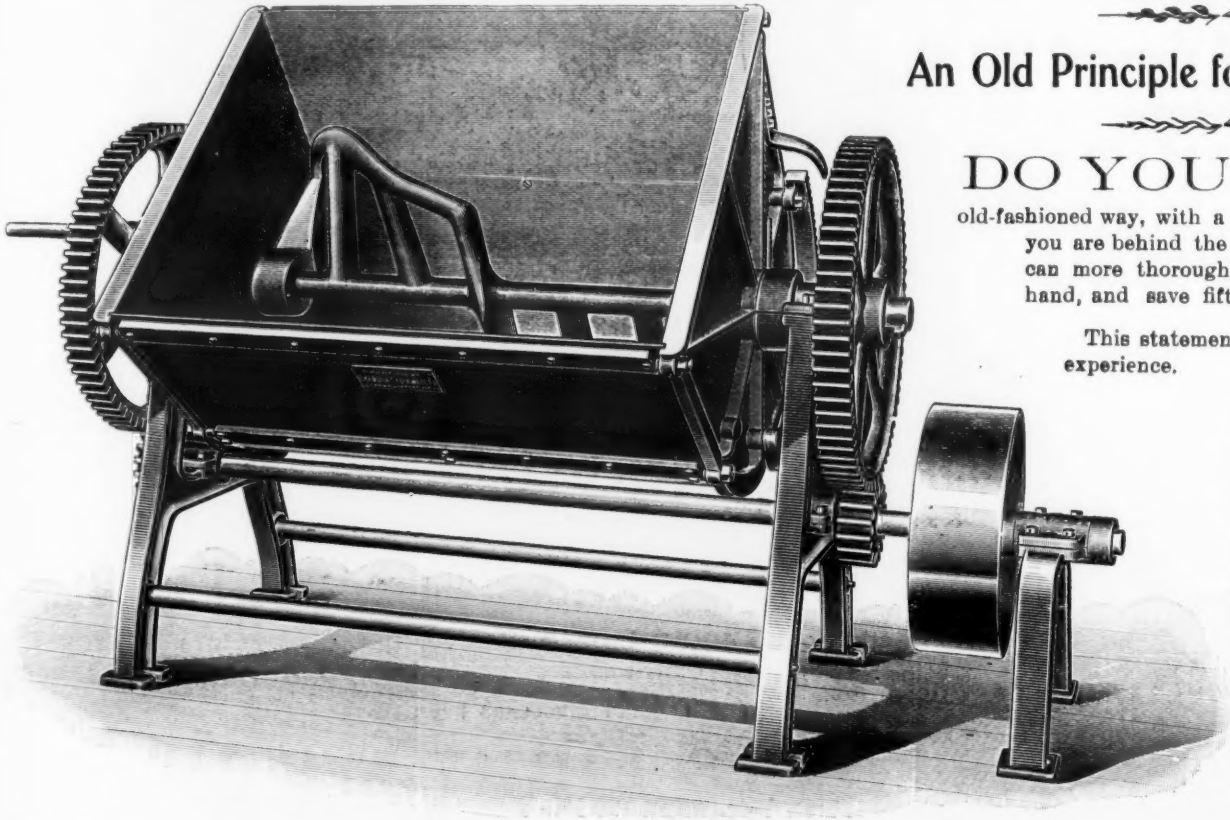
REQUEST CIRCULARS FROM

THE WELLS LIGHT M'F'G. CO.,

EDWARD ROBINSON, Sole Proprietor.

44-46 WASHINGTON STREET, NEW YORK.

BOSTON FOUNDRY MIXER.



An Old Principle for a New Purpose.

DO YOU mix your facing sand, core sand, fire clay, etc., in the old-fashioned way, with a laborer and a shovel? Then you are behind the times. With this mixer, you can more thoroughly mix it than is possible by hand, and save fifty per cent. of your labor.

This statement can be verified by actual experience.

The material is shovelled into the machine or fed in through a hopper, after riddling. The machine is then started, and in five minutes the mass is perfectly mixed. Turning a crank at the side cants the machine and empties the material either on the floor or into a receptacle provided.

Capacity, 250 lbs. every five minutes.

Pulley, 24 in. diam. x 6 in. face.

Floor Space, 7 ft. x 3 ft.

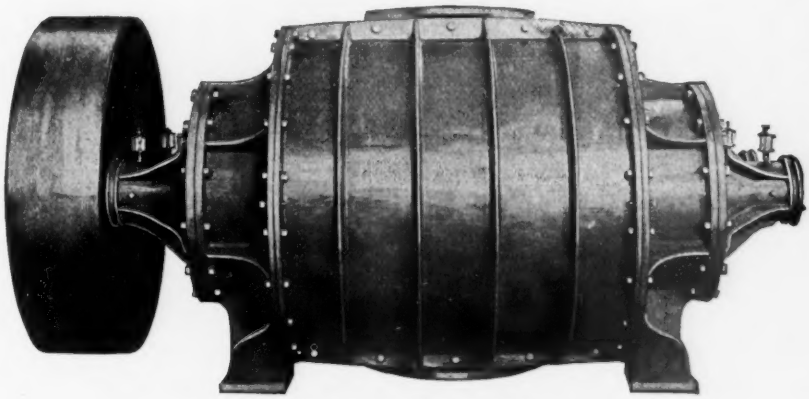
Speed of Pulley Shaft, 125 revolutions.

Weight, 1250 lbs.

For further particulars, write

BARBOUR-STOCKWELL CO., 205 BROADWAY, CAMBRIDGEPORT, Mass.

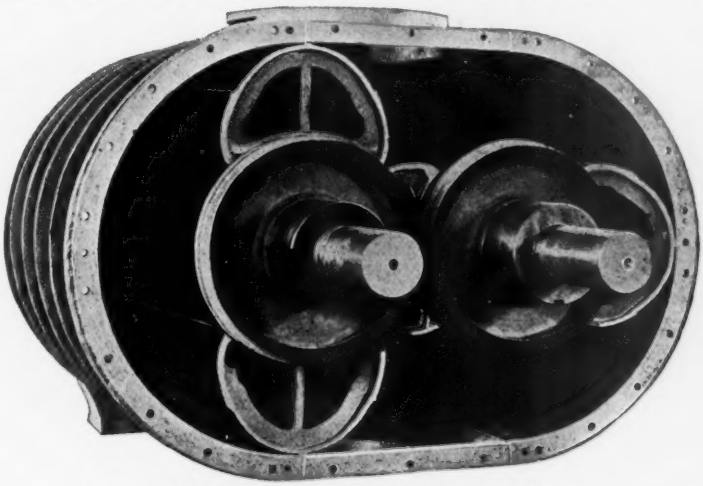
THE GREEN Rotary Pressure Blower



NEW CENTURY PATTERN.

YOU WILL SEE That the working parts are two perfectly balanced impellers mounted on forged steel shafts. They run in bronze bushings, detachable journal bearings and the cut gearing at both ends of the blower is enclosed in oil tight casings.

The Green Blower occupies less space and weighs less than any other Positive Blower in existence.



NEW CENTURY PATTERN—INTERIOR.

Foundry Blowers, High Pressure Blowers, Gas Exhausters, Exhausters for Hot Gases.

THE GREEN GIVES THE MOST VALUE FOR A $.

SEND FOR NEW CATALOGUE B.

Wilbraham Baker Blower Co.,

PHILADELPHIA, PA.

Sales Agents: FRAZER & CHALMERS, Inc., Chicago, Ill. and Branch Houses.

BARBOUR-STOCKWELL CO., CAMBRIDGEPORT, Mass.

Smooth-On Cements

In up-to-date foundry practice, the time has come when the intelligent use of an iron cement that will withstand fire, water and steam and stay where it is put, has become a shop necessity. A blemish on an iron casting may not injure it, but like a wart on a nose it looks ugly and should be removed. Just here is where Smooth-On Castings is valuable to the manufacturer in saving good castings and to the consumer in avoiding delays in procuring them. Don't use an inferior filling because it is cheap, to do so is neither wise nor economical. Use only the best. Then with an expert, whose good judgment in the use and skill in the application, Smooth-On Castings saves time and money. Smooth-On Castings is useful for many other purposes, daily new uses are being discovered for it.

We make a Smooth-On Compound for Engineers and Steamfitters use, for making connections to withstand high temperatures and high pressures. Unequaled for making Flanged Joints and Boiler Patching.

We also make a special cement for connecting coils, for ammonia machines, for refrigeration. Write for Catalogues and Prices.

SMOOTH-ON MFG. CO.,

VREELAND TOMPKINS, CHEMIST AND MANAGER.

547-549 COMMUNIPAW AVENUE. JERSEY CITY, N. J., U. S. A.

ROOTS'

BLOWERS

There are Brier ROOTS
Cube ROOTS
Square ROOTS

BUT
ONLY
ONE

P. H. & F. M. ROOTS

ALWAYS THE STANDARD.
OTHERS IMITATE, BUT NEVER EQUAL.

Forty years' experience boiled down to the most modern *Pressure Blower* in design and workmanship.

THE ROOTS obtains the *minimum of friction* and the *maximum of efficiency*. Others do not—cannot

P. H. & F. M. ROOTS CO.,

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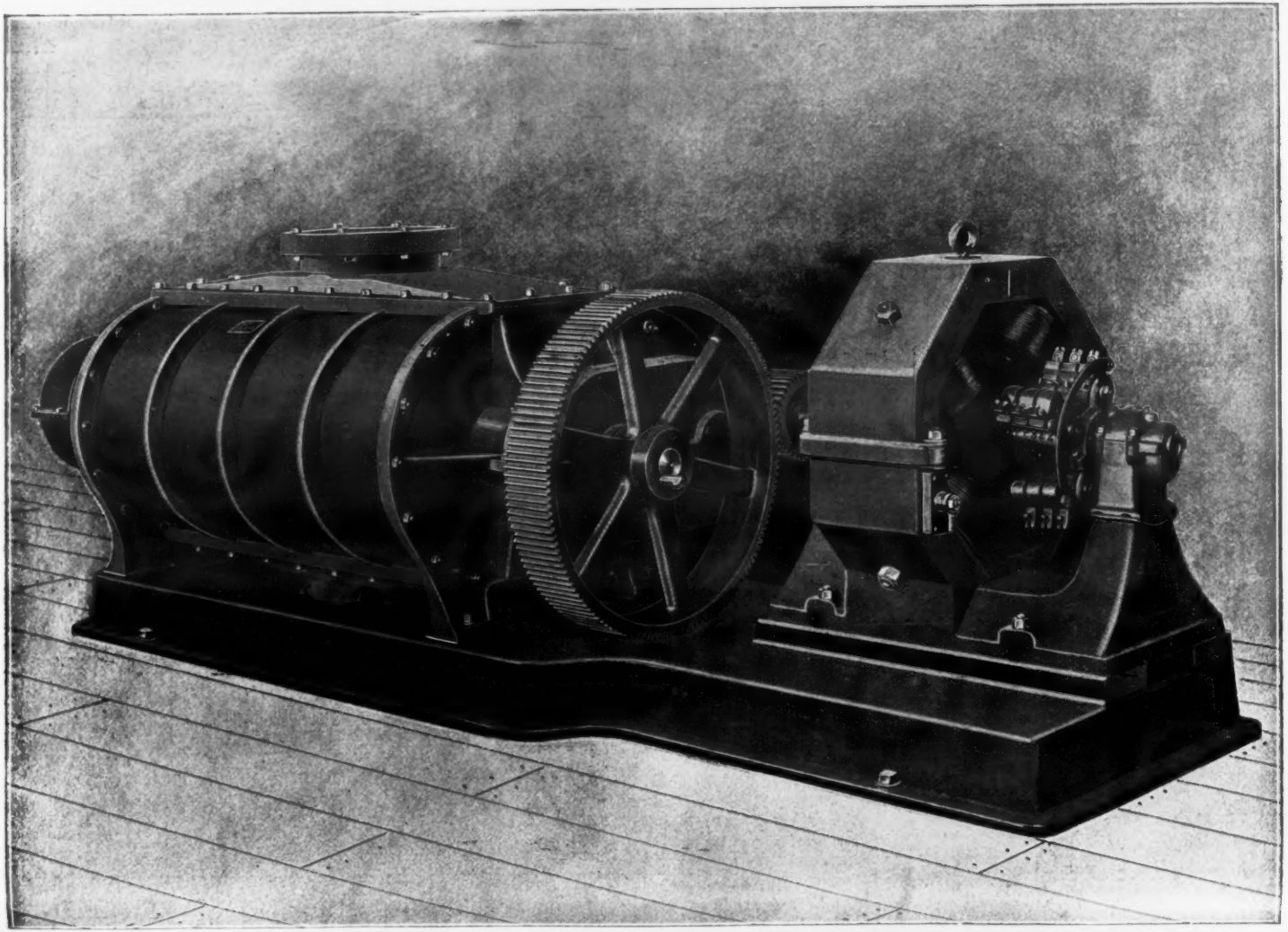
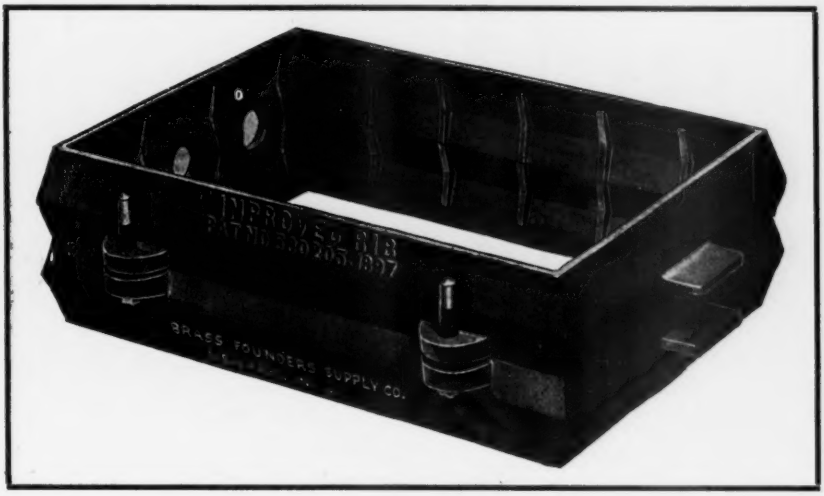


FLASKS



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BEVELED and STRAIGHT SIDE

ALL ONE PRICE, KEPT IN STOCK.

Brass Founders' Supply Co.

NEWARK, N. J.,
U. S. A.

OUR 1900

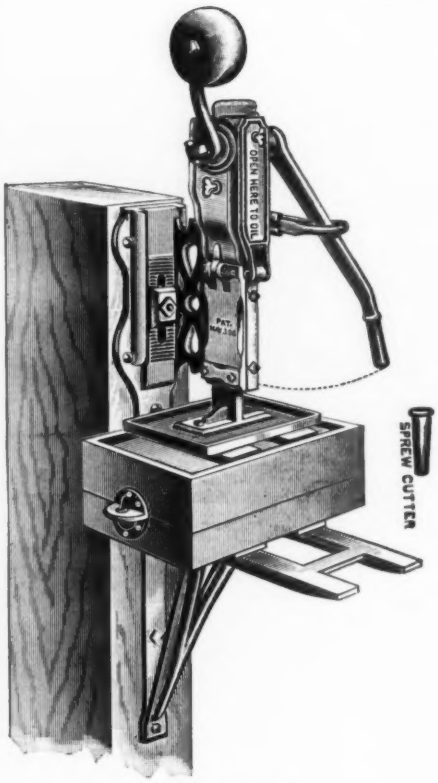
FOR THE ASKING.

Every Requirement for an Up-to-Date Foundry.

W. B. BURNS'

Economic Molding Machine

SYRACUSE, N. Y.



The

QUICKEST Adjusted

EASIEST WORKED

and

Most POWERFUL

Machine on the market,

Giving a POSITIVE

UNIFORM Pressure.

No DUST can get to WORKING parts

WHICH ARE ALL ABOVE THE SAND PILE.

MANUFACTURED BY

Syracuse Malleable Iron Works,

SYRACUSE, N. Y.

CORRESPONDENCE SOLICITED.

C. A. STEVENSON ROBERT FIELD

Stevenson, Field & Co.

PIG IRON, COKE, SMITHING COAL

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AGENTS IN VARIOUS SECTIONS FOR

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"Pencost" Ferro-Silicon Softener

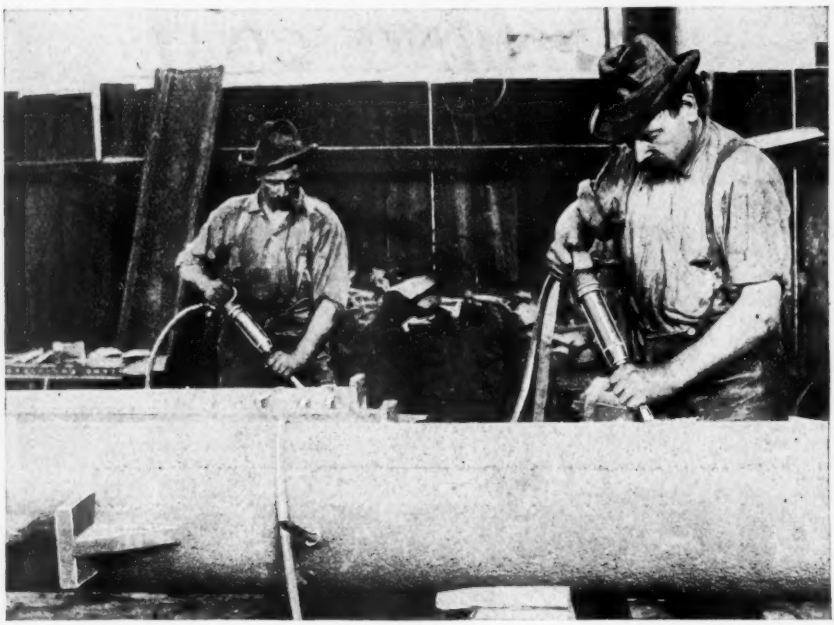
"Crescent" Ohio Strong Foundry

"Preston" Connellsville Foundry Coke

"Powellton" West Virginia Foundry Coke

PLEASE SECURE OUR PRICES

CHICAGO PNEUMATIC TOOL CO.



We manufacture **Pneumatic Tools** in designs and sizes to meet **Foundry Needs.** With our **Chipping Hammers, One Man** with **One Tool** will do the **Work** of **Four Men.** The tools are the most substantially made, and operate with the **Smallest Amount of Air.** Our **Air Drills** are adapted to all kinds of **Drilling, Reaming and Tapping,** and are especially valuable on heavy work that cannot be readily put under your drill press. Our facilities are unequaled for supplying **Air Compressing Plants** in any capacity for **Belt Connection** to your power, or for installing **Direct Connected Steam** or **Gasoline Engine Outfits** and **Air Hoists** in any size and capacity wanted. We are the largest manufacturers of **Pneumatic Tools** in the **World** and our product is the **Best on Earth.**

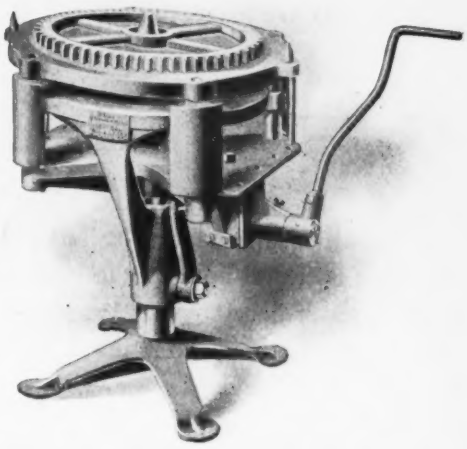
NEW YORK OFFICE:
95 LIBERTY ST..
NEW YORK.

GENERAL OFFICES.
MONADNOCK BLOCK,
CHICAGO.

The man with the machine

is the molder of the future. This is because the majority of castings can be turned out at less cost with mechanical facilities than without them.

Not only will the right kind of a molding machine increase your output but it will also at the same time produce a better grade of castings. There is a uniformity about machine molded castings that hand work can never approach.



The machine we show on this page molds a certain style of gear wheel. A man with this machine can make as many castings as four men with ordinary patterns. The castings are practically equal to machine cut gears. Such results can not be obtained with old methods. Write us about some of the jobs you have and are continually repeating. The consultation is free and if we can not help you we will frankly tell you so. The Weiss Molding Machine is built to order only. It is built to meet any special condition.

We have a booklet you should ask for.

Maywood Foundry & Machine Co.,

MAYWOOD, ILL.

The Opinion of a Prominent Foundry Manager.

" If your work is light and you are using a large amount of small cores, by all means have a Millett Oven, that takes so little room, and your oven is always hot and the cores dry in one-half the time that they would in an ordinary oven. When you draw out one of the shelves on these ovens, there is a door that closes from the inner side, keeping all of the heat in the oven."

—Extract from an article on the " Design and Equipment of Foundries," in THE FOUNDRY *for April. Contributed by R. P. Cunningham.*

Could we choose better words to convince you that the Millett Core Oven is something you should not do without.

Millett Core Oven Co.,

BRIGHTWOOD, MASS., U. S. A.

On Exhibition at and for sale by { ***THE S. OBERMAYER CO., Cincinnati and Chicago.*** ***THE J. W. PAXSON CO., Philadelphia.***

70

ELECTRIC VENTILATING FANS

Dust Proof Motor. Shipped Ready for Operation

CARRIED IN STOCK

Send for Bulletin Q

B. F. STURTEVANT CO., Boston

New York Philadelphia Chicago London

A Few Dollars

Invested in a short stub of a trolley track will convince you that, no matter what kind of cranes you have in your shop nor how efficient your hoisting machinery, your equipment is not complete without this self same trolley track.

Most of the things that have to be handled in the shop are small things comparatively. Does it not seem like a waste of power to be running a thirty ton crane from one end of the shop to the other just to pick up something that does not weigh more than a couple of hundred pounds?

The trolley track is an auxiliary to your other conveying appliances. It means rapid transit for everything that has got to be shifted. It keeps your men moving because there is no waiting and no excuses to fall back on.

If you are in doubt as to what a trolley track can do for you, fix up part of your plant at first. You will order additions thereto without our solicitation.

By forwarding us a sketch of your plant you can obtain an estimate as to what a complete conveying system will cost you. There are no charges for this consultation.

Remember there is just **one** trolley track, **The Coburn** with Rounded Troughs.

Coburn Trolley Track Mfg Co.,

HOLYOKE, MASS., U. S. A.

"LITTLE GIANT"

Pneumatic Hammers

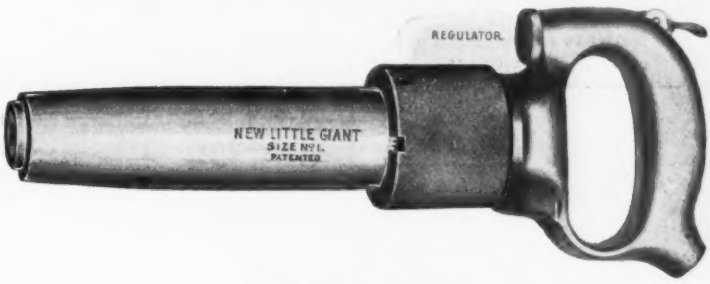
ARE ESPECIALLY DESIGNED FOR CHIPPING CASTINGS.

LIGHT. SIMPLE IN CONSTRUCTION.

DURABLE. EFFICIENT.

They have an air regulator which can be so adjusted as to admit a minimum amount of air and yet deliver a blow with full force of hammer under various pressures.

MADE IN ALL SIZES.
Used in Foundries throughout the World.



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Guaranteed Against Repair for One Year.

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Standard Pneumatic Tool Co.,

Manufacturers Piston Air Drills, Boring Machines, Reversible Motor Chain Hoists, and all kinds of Pneumatic Tools and Appliances.

Main Office and Works, CHICAGO, U. S. A.

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HUGH W. ADAMS & CO.,

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Agencies,
Chicago, Detroit, New York,
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American Pig Iron. Foreign Pig Iron.
In bond or duty paid.

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PIG IRON, STEEL
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Charcoal, Pig Iron and 72 Hour Foundry
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PIG IRON.

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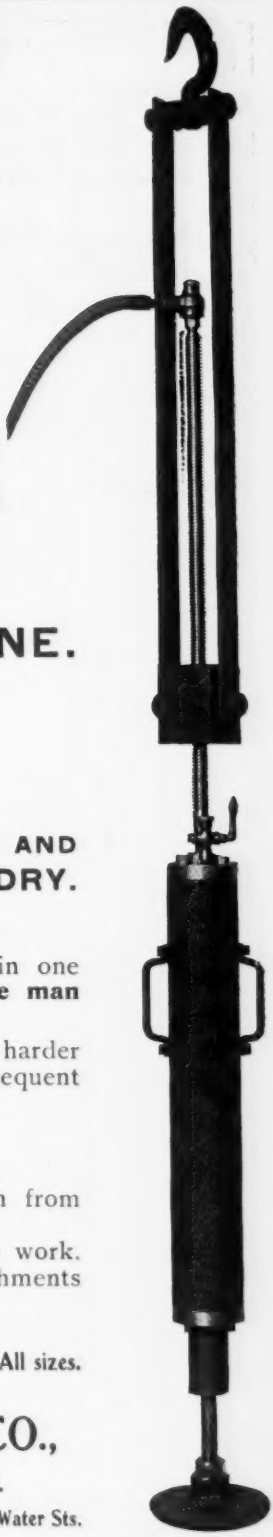
FARWELL'S **MOLDING MACHINES** Send for Catalogue

THE ADAMS COMPANY, DUBUQUE, IOWA



PNEUMATIC RAMMER

A PERFECT SUCCESS AS A MACHINE.

A PERFECT SUCCESS AS A MEANS OF SAVING TIME, MONEY AND METAL IN THE FOUNDRY.

IN THE FIRST PLACE you can do heavy molding in one quarter the time required for hand ramming, **and one man can work it.**

IN THE SECOND PLACE, the mold will be rammed harder and more uniformly thus preventing "straining" and consequent loss of 10% to 20% of metal.

MADE IN THREE SIZES.

Small size for hand use. Large sizes for suspension from crane.

Easily and quickly put up and moved about over the work.

A great labor saver in **Pipe Foundries.** Special attachments for this work.

When the Casting cools off use our Pneumatic Hammer for Chipping. All sizes.

PHILADELPHIA PNEUMATIC TOOL CO.,

NEW YORK.	PHILADELPHIA.	PITTSBURG.
149 Broadway.	21 So. Twelfth St.	Wood and Water Sts.

There is no better Spring Medicine

for a foundry, than a car load or two of

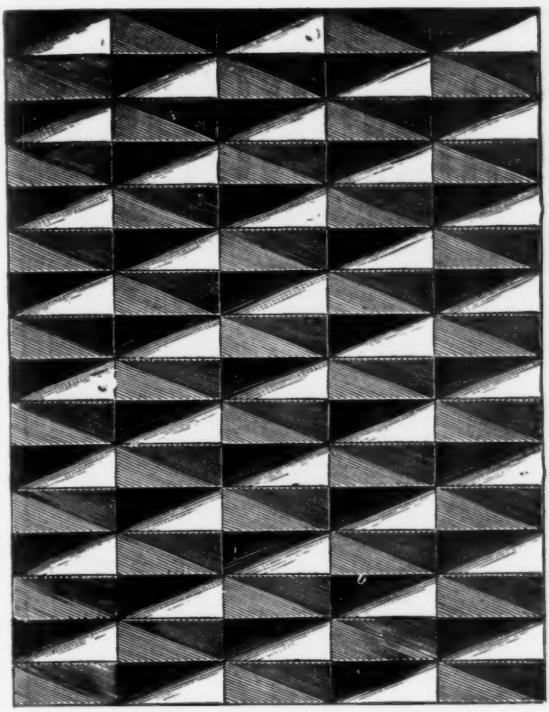
AYERS' ZANESVILLE SAND.

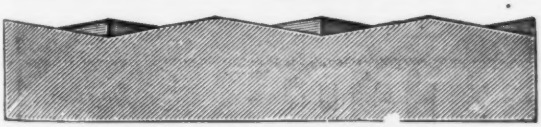
MAY be you have been stinting yourself during the winter to make your supply last 'til spring. Very likely the heaps are run down and the molders have got to spend more time in securing than they ought to. We have sand for all classes of castings; sand that will suit a pile driver casting, sand that is used in making art castings. Digging molding sand is a sort of hobby with us. We may not know much about anything else, we know the sand business thoroughly. The sand that Ayers ships from Zanesville is the finest molding sand found anywhere. Coupled with its abundance is the best of transportation facilities. The benefit from this is yours. We shall be glad to furnish you prices for the season's supply.

E. M. AYERS, ZANESVILLE, OHIO.

WESTERN REPRESENTATIVE.

H. S. VROOMAN, 220 West 20th St., CHICAGO, ILL.





The above cut shows exact size of Diamonds.

Diamond Pattern Lumber,

—FOR—

DOOR SILLS, PLATFORMS, STEP PLATES, Etc.

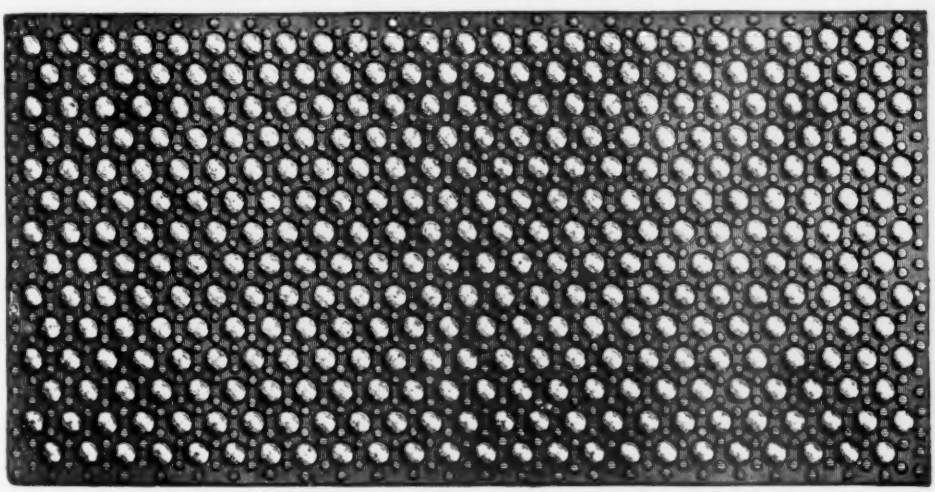
This Patent Lumber is made by a Special Machine invented by us, the ONLY Machine of its kind, and each piece will match PERFECTLY with all other pieces, by "joining" the edges to the centre, lengthwise, or any row of Diamonds.

Size of each piece, 8 feet long by 6 inches wide, and ½ inch thick. Send for sample.

BROWN BROS. MFG. CO.

Cor. Clinton and Jackson Sts. Chicago.

PRISMATIC SIDEWALK LIGHT TILE.

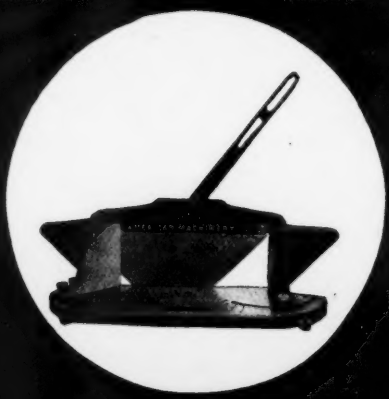


Make your own frames and we will furnish you with Tiles for either Iron or Concrete Lights. Write for prices.

BROWN BROS. MFG. CO.,

Cor. Jackson and Clinton Sts. CHICAGO.

OLIVER WOOD TRIMMERS



SAVE MONEY ON PATTERNS

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CHEAPER AND BETTER THAN FLOUR, ROSIN, OR OIL

Used by Penna. R. R., Westinghouse Companies and other first-class foundries throughout the United States and Europe

NO BLOWN CASTINGS

AMERICAN GLUTROSE WORKS
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IN THE WORLD OF THE

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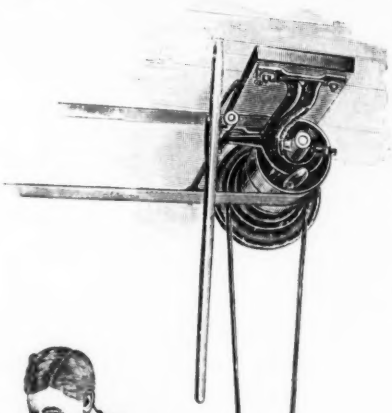
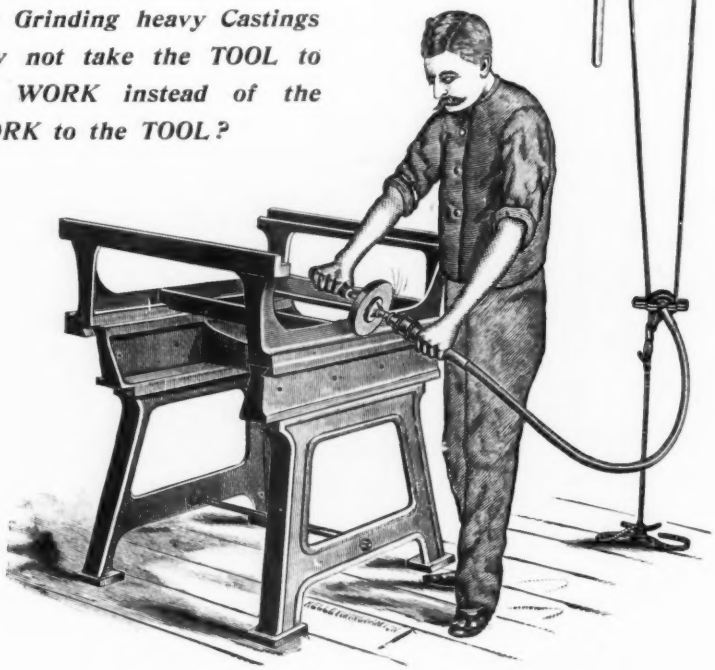


For Grinding heavy Castings why not take the TOOL to the WORK instead of the WORK to the TOOL?



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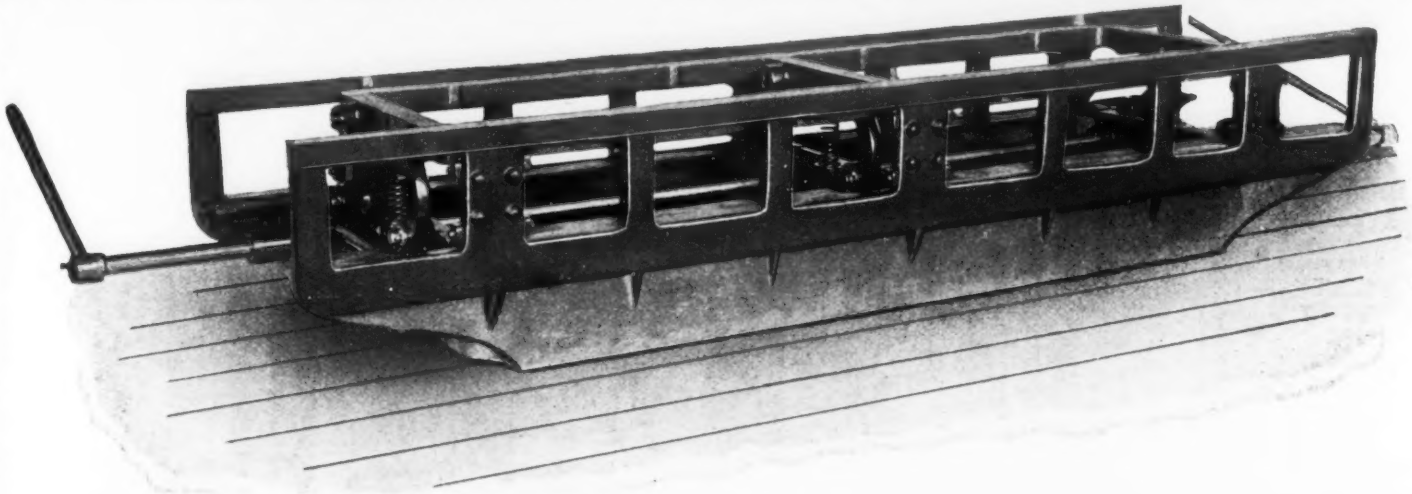

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FOR CASTINGS OF ALL WEIGHTS AND SIZES.

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Ratio of Fuel to Iron, -	1 to 11.18

The metal was carried over 450 ft. and cast into pieces varying in weight from ½ lb. to 24,000 lbs. each, including 12 columns 15 ft. long.

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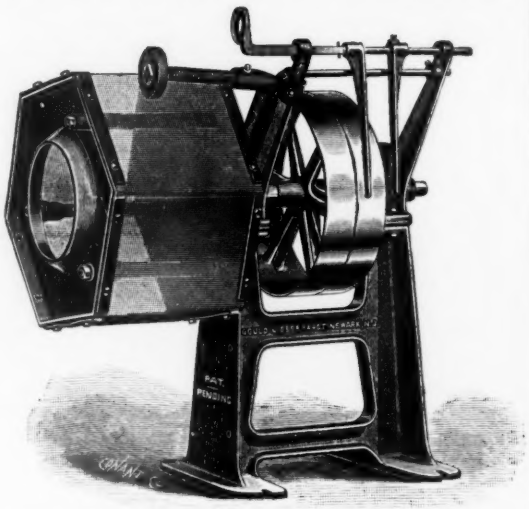

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Made single or double end, belt or motor driven.

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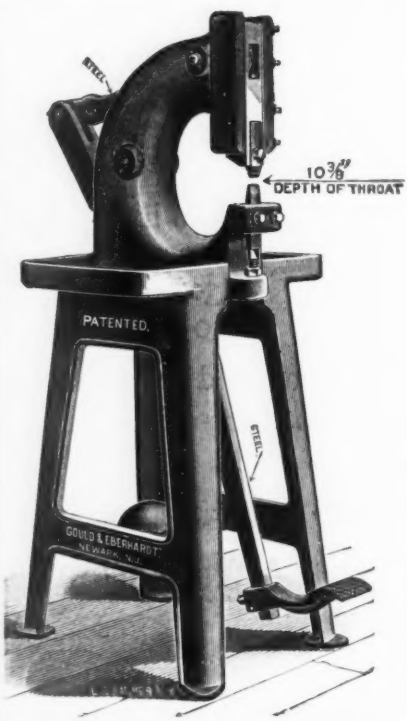

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Capacity is very large, with room to accommodate all sizes of castings, both in front of and in back of knives.

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No. 5, Newport, Ky., Sand, $93\frac{16}{100}\%$ Silica.

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THE OHIO VALLEY SAND controlled exclusively by The Newport Sand Bank Co., wears longer and makes a better surface on castings than any other in the market. This sand, composing the largest body of molding sand controlled by any one company, contains the greatest variety of grades, combined with the very best shipping facilities. Guaranteed to be the most economical sand in use.

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ROOM 735 MARQUETTE BUILDING.
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MINES.
Newport, Dale and Cold Springs, Ky.
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IRON and STEEL CASTINGS

FREE SAMPLE FOR THE ASKING.

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The Universal Molding Machine

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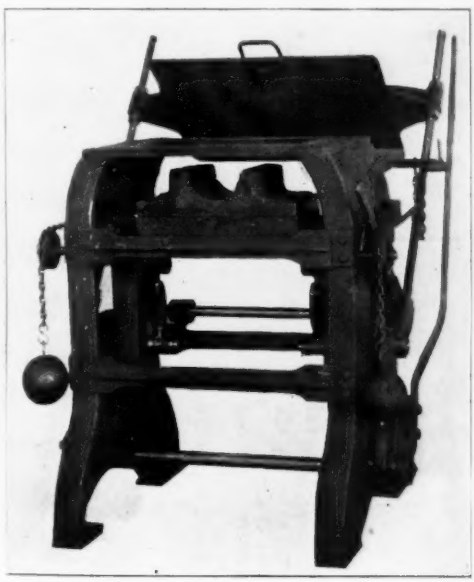

Instant adjustment of pattern.

Instant variation in length of draw from 1 to 10 in.

Will take flask of any size.

Universal Molding Machine Co.,

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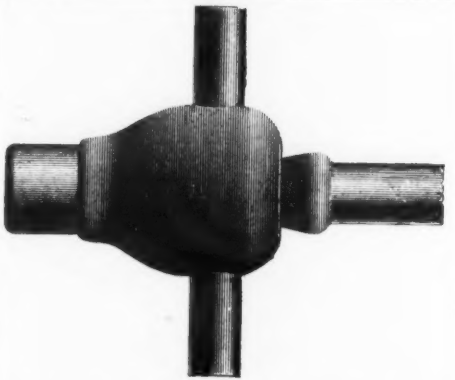
THERE IS ONLY ONE CORE OIL



Valve Cores, especially the smaller sizes, are sometimes difficult to vent. By the use of the **Holland Core Oil** the cores are made porous and allow perfect castings to be made, **without vents if necessary.**

When you get down to Actual Facts

AND THAT IS THE

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MADE ONLY BY THE

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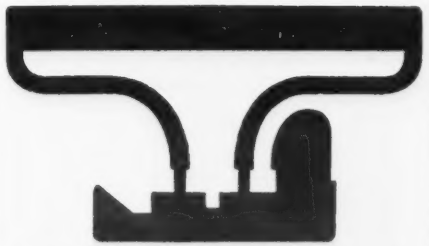
We are ready to prove the fact by practical demonstration at your foundry. Write us at once for full information.



Cores of this shape are made in many foundries **without vents** when **Holland Core Oil** is used. Judge for yourself of the saving effected.

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MINERS AND SHIPPERS OF
ALL GRADES OF

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OUR SAND IS SECOND TO NONE.

SAMPLES SENT ON APPLICATION.

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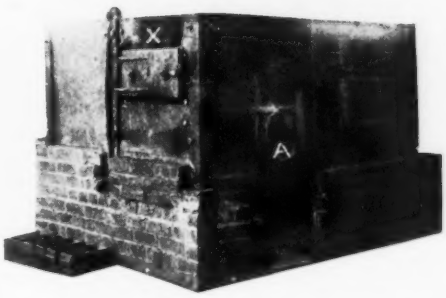
OPEN HEARTH OIL FURNACE

FOR MELTING COPPER AND BRASS.



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I contract to put up these furnaces and furnish all the equipment required to economically burn oil.

I also build small round furnaces for melting in No. 18 and No. 20 Crucibles with Oil.

It will pay you to investigate what I have to offer.

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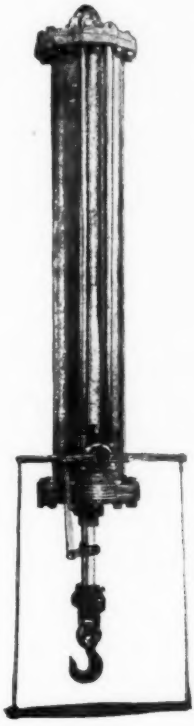

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Ladles, Tumblers, Trucks, &c.

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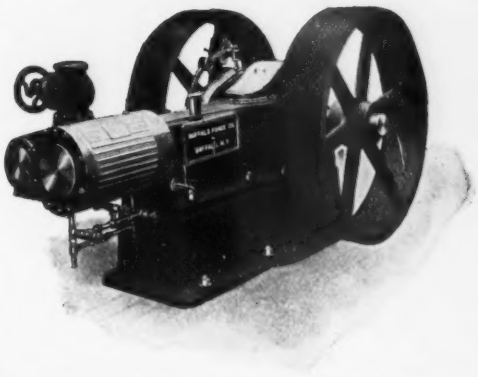

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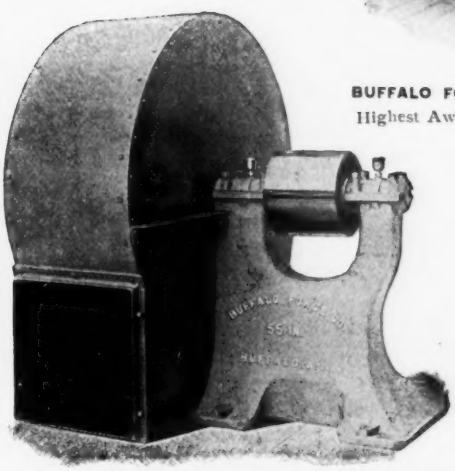

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Tumbling Barrel Exhausters are easily applied, thoroughly efficient, and change casting cleaning rooms from a death-dealing pestilence to a comfortable working apartment.

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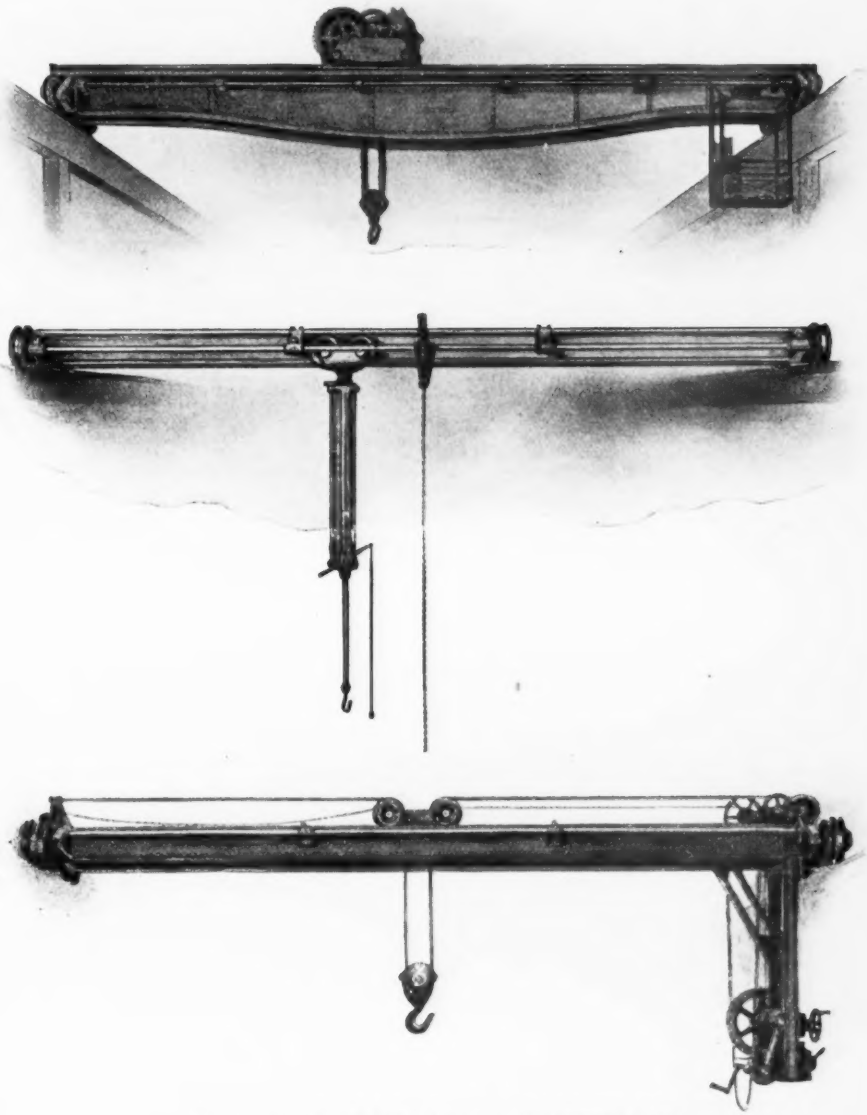

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FOUNDRY

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WANTED—Position as foreman with firm making light machinery castings. Experienced on all kinds of molding machines. Up-to-date in cupola practice, core-making, etc. Live man, aggressive, no experiment. Salary proportioned to the labor. Address "M. E." Box 395, care of THE FOUNDRY.

FOUNDRY BLOWERS FOR SALE—No. 1 Root's improved style, excellent order, $100.00. No. 2 Root's latest style, nearly new, $150.00; No. 4½ Baker, perfect order, little used, $250.00; No. 6 Baker, perfect order, nearly new, $400.00. Blowers bought, sold, exchanged and repaired. A. Asher, 109 Liberty St., New York.

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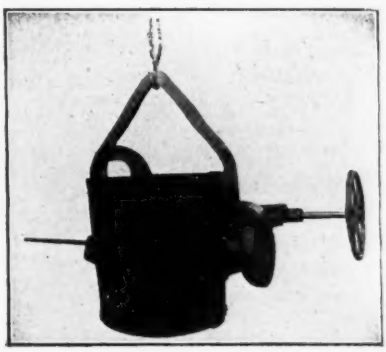

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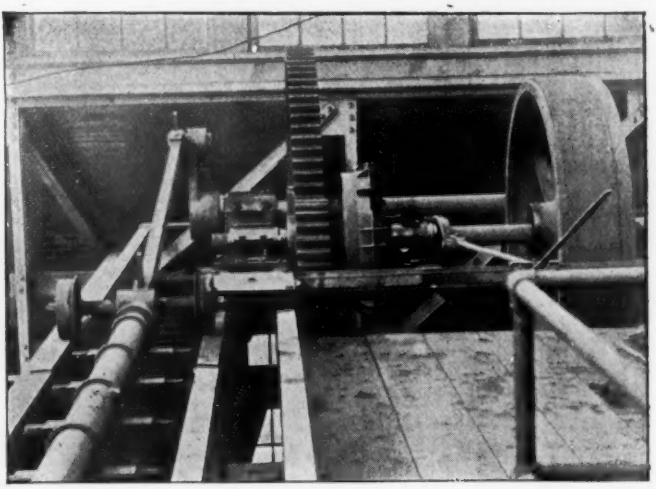

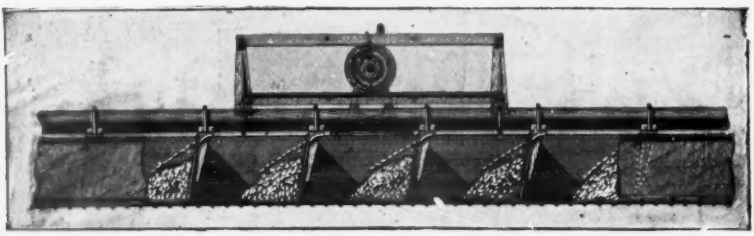

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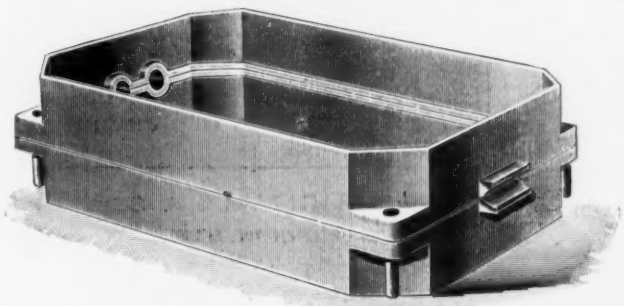

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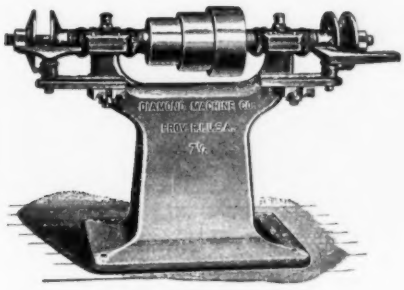

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was designed by us for foundry use. One stove maker has 16 of them. The distance between wheels is 48 inches, diameter of spindle between flanges 1¾ inches or 2 inches, as ordered. Babbitted boxes with three ring oilers. Weight, 1200 lbs. If you want a good substantial grinder write us for circulars and prices.

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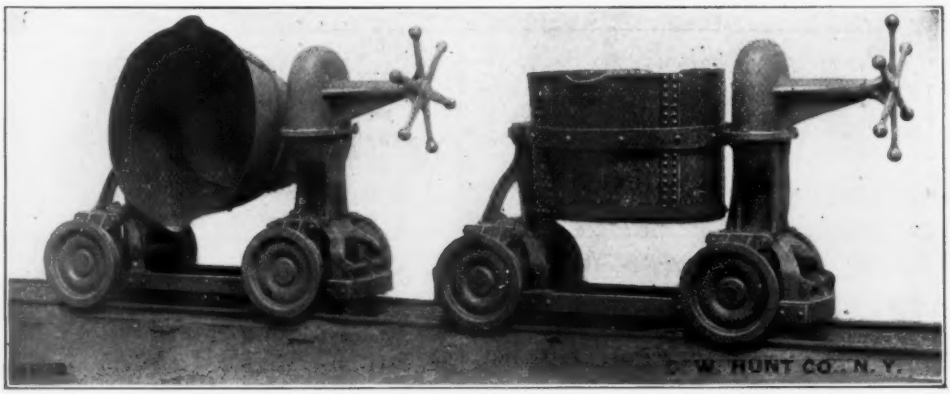

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Many foundrymen believe that these cars are not only more convenient to use in distributing molten metal, but are also safer than any overhead system of cranes or tackles. No accident has ever occurred in the use of these cars. The height of the top of the ladle above the rails, when upright, is 36 inches; for convenience in pouring into hand ladles, the shape of the body and the position of the trunnions are arranged so that the spout, when tipped, pours into a ladle 17 inches high. The gear for revolving the ladle, is our patent cam gear, that locks the ladle in every position, and possesses the remarkable feature of having both shafts revolve in the same direction. When the handles are moved, the ladle moves steadily in the same direction as the handles, but only one-twelfth as fast.

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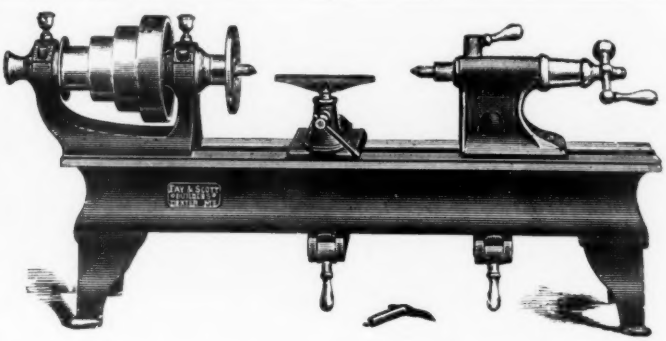

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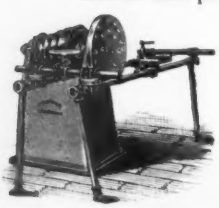

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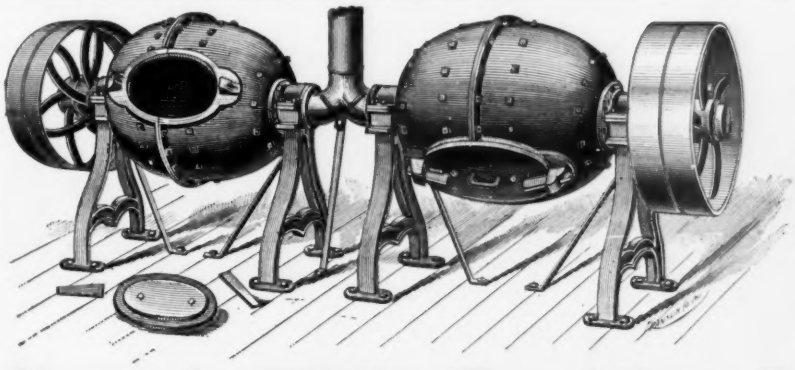

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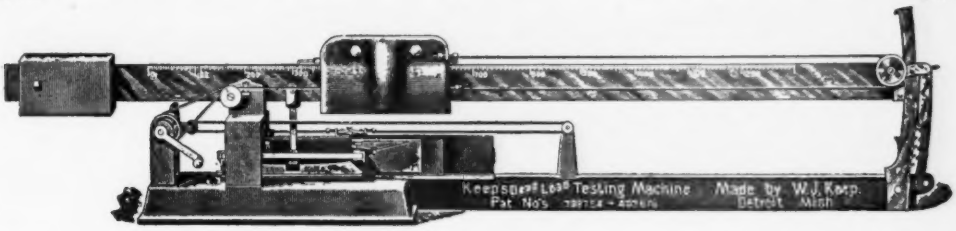

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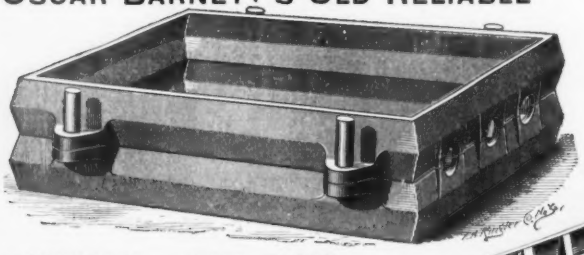

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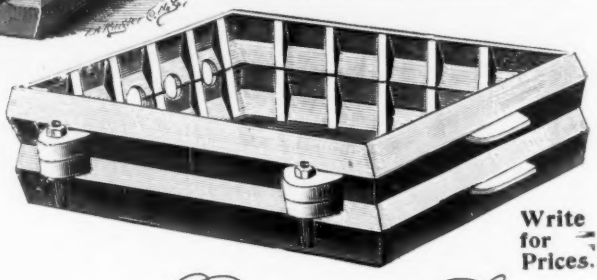

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A full chance is offered intending purchasers to investigate. Address,

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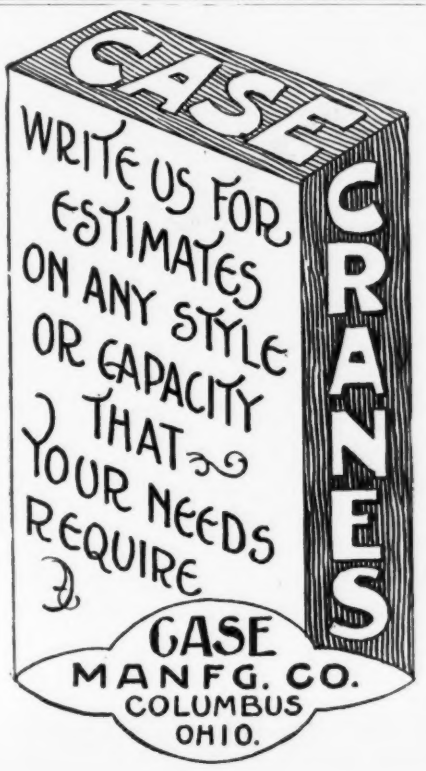

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Will you write us to quote you prices on these same chaplets, delivered right at your place?

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In writing for prices tell us what kind of chaplets you use, better still, send us a sample.

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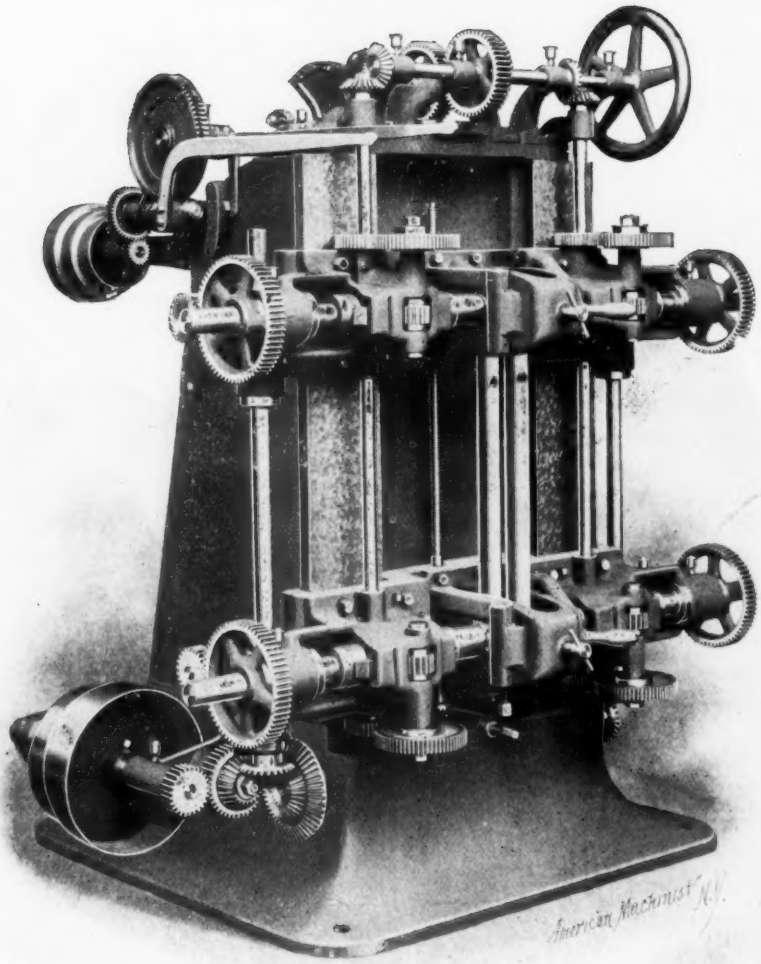
Quality first-class and prompt shipment guaranteed. Catalogue and prices furnished on application.



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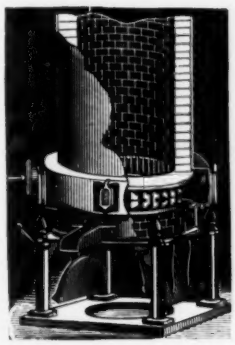

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It melts the iron every time.

Through the very simple method of evenly distributing the blast it becomes an economical melter.

Write us how much iron you want to melt an hour. We will quote you a price that will interest you. If accepted you can have the Cupola in a hurry, if you have to.

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Quarter Page,	-	-	-	*$ 8.50*
Half "	-	-	-	*15.00*
Page	-	-	-	*25.00*
Undisplayed Advertisements,				*30c. per line.*

ONE RATE TO ALL

Don't believe him

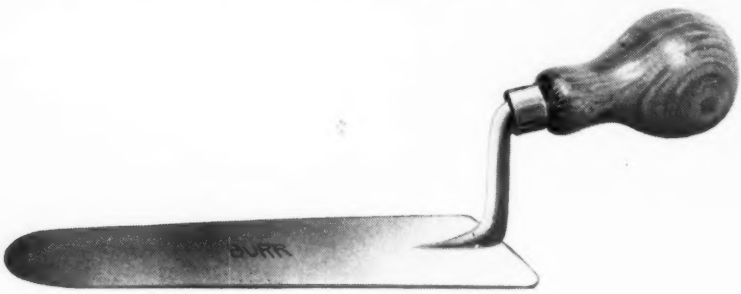
When that fire brick man tells you that a high priced brick with a high sounding name is the only brick for your cupola, **don't believe him.** Make him guarantee his brick to withstand the abrasion as well as the heat or don't try them. Our **"DOME" BRAND** of **CUPOLA BLOCKS** are the best made and are displacing the high priced blocks and furnishing far better results. Try them. We have been obliged to double our capacity, need we say more. Don't forget **we handle other bricks too** if you want them. Also, **Molding Sand, Loam, Etc.** Can we send you a sample? We can name you prices that will get your business. Try us.

CAN'T WE SEND YOU A SAMPLE?

GARDEN CITY SAND COMPANY,

188 Madison St., Chicago, Ill.

We are the largest manufacturers of Molders' Tools in the world. Every first class Foundry Supply House and Hardware Store sells them.



If you want the Best Tools made, be sure and order Tools manufactured by

BURR'S DAMASCUS TOOL WORKS,

66-72 FORT STREET EAST, DETROIT, MICH.

VULCAN

VULCAN BLACKING

This is suitable for ***Dry Sand*** work of ***all kinds*** and ***Cores*** of all sizes.

There are a few foundries who are not using this Blacking, and this advertisement is intended particularly for them. We give below copies of recommendations from two well known concerns, one in the State of Ohio and the other in the State of Connecticut.

STEUBENVILLE, O., March 9, 1900.

"The Vulcan Blacking received from you gives entire satisfaction and is all you claim for it."

Yours respectfully,

(Signed), MEANS F'D'Y & MAC. CO.

BRIDGEPORT, CONN., April 6, 1900.

"Yours of March 20th is just at hand, and in reply would say that our foundry foreman reports that the Vulcan Blacking sent us has proved very satisfactory indeed, in fact the best he has ever used, in view of this you may ship us three barrels same as last."

Yours very truly,

(Signed) P. H. SKIDMORE & SONS.

We could show hundreds of such letters but want of space prevents us.

WE SOLICIT TRIAL ORDERS

J. S. McCormick Co.,

FOUNDRY EQUIPMENT AND SUPPLIES,

PITTSBURG, = = = PA.

40 BRANDS OF PIG IRON.

10 BRANDS OF FOUNDRY COKE

20 YEARS OF EXPERIENCE

in the Pig Iron and Coke business has enabled us to secure an unequaled line of Blast Furnace and Coke Oven connections.

We are prepared to supply promptly the best brands of

High Silicon **Malleable**

Car Wheel **Bessemer**

Foundry **Forge**

Pig Iron from furnaces located in all the producing sections of the United States. Also,

72 Hour Foundry

48 Hour Furnace

coke from Connellsville, Pocahontas, New River, Virginia and Alabama.

Inquiries are respectfully solicited.

Rogers, Brown & Co.,

Cincinnati. Pittsburg. New York. Cleveland. Chicago. Boston. Buffalo. St. Louis. Philadelphia. Birmingham.

Mathematics Applied to Cupola Linings.

Cupola shell 52 in. in diameter, lined from drop doors to bottom of charging door 20 ft., and to make inside lining 40 in.

As sold to party mentioned in last issue of The Foundry by some other manufacturer:

460 9x9x4½ Blocks @ 9½c., - - $ 43 70

These lasted four months.

As sold by ourselves:

560 12x6x6 Blocks @ 16 c., - - 89 60

We guaranteed ours for eight months.

Above is cost of the two kind of blocks only. The lining desired was 6 in., to reduce 52 to 40 in. The first lining for four months cost:

1000 Brick, laid flat inside, - - -	22 00
560 Blocks, 9x9x4½ @ 9½c. - -	43 70
4 bbls. Clay, $1.50, - - -	6 00
Total, -	$ 71 70

To replace this lining with same kind at expiration of four months would make lining cost:

First four months cost, - - -	71 70	
Tearing out and replacing, (low estimate)	3 00	
460 Blocks, @ 9½c. - -	43 70	
2 bbls. Clay, $1.50, - - -	3 00	
Total,		$120 40
Ours cost, 460 Blocks, 12x6x6, @ 16c., -	$ 89 60	
2 bbls. Clay, $1.50, - -	3 00	
Total, -		$ 92 60

Ours guaranteed eight months.

Saved in using our lining, - - $ 57 80

THINK IT OVER AND WRITE US.

THE S. OBERMAYER CO.,

Who make anything in the way of Fire Brick and furnish patterns. . . .

CINCINNATI. CHICAGO.

Pure East India Plumbago . . . .

SILVER LEAD, GRAPHITE.

Guaranteed to be Absolutely Pure and Unadulterated.

Let us send you a Sample Barrel, and if not as represented return to us at our expense.

. . . . THE . . . .

S. Obermayer Co.

CINCINNATI, O.
CHICAGO, ILL.

Write for General Catalogue No. 26.

Sea Coal Facing.

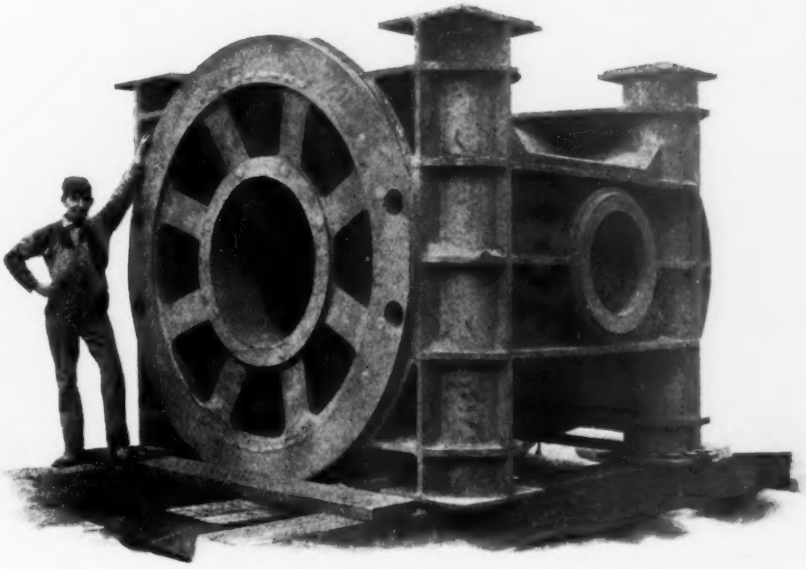
Bituminous Facing.

CAR LOADS OR LESS—IN BAGS OR BBLS.

Guaranteed to be ground fine and uniform, go further in use and produce better results than any others.

LET US QUOTE PRICES.

A BEAUTIFUL CASTING IS ALWAYS ADMIRED



Here is a 78 x 60 inch Corliss Low Pressure Steam Cylinder, which weighs 44,212 pounds. It is the same casting as we illustrated last month, cleaned up and ready for the machine shop. Its appearance reflects credit upon the makers, THE HARLAN & HOLLINGSWORTH CO., Wilmington, Delaware.

This casting was made in **Lumberton Molding Sand** and **Millville Gravel** with **Blacking** furnished by

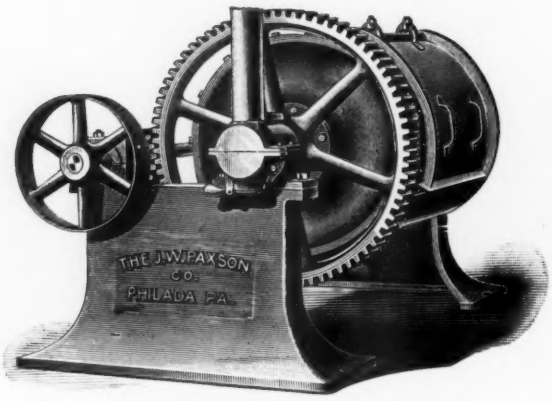
The J. W. Paxson Co.,

PHILADELPHIA, PA.

The same combination will make nice castings for you too.

Paxson Exhaust Rumblers

MADE OF STEEL.



MADE IN SIZES:

18	inch	diameter,	any	length	from	24	inch to	48 inch.
24	"	"	"	"		30	"	48 "
30	"	"	"	"		36	"	54 "
36	"	"	"	"		36	"	54 "
40	"	"	"	"		36	"	60 "

No Cast Iron Staves

BUT

One Solid Sheet of Steel.

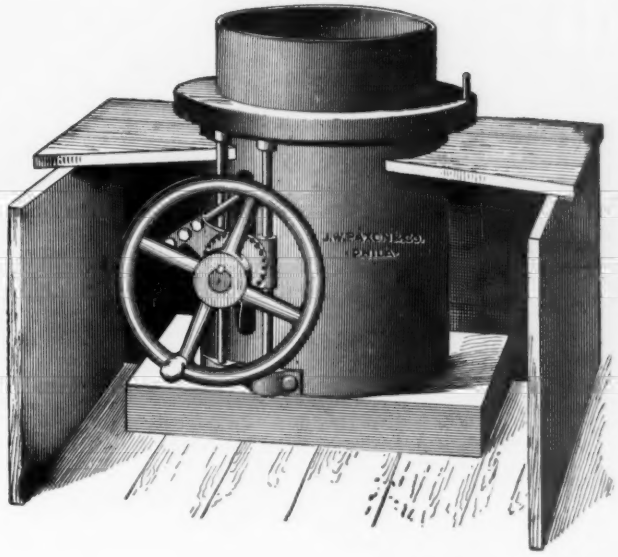
Wide Door Extends Full Length of Mill.
Ribs on Inside to Keep Castings from Slipping.

We have lately installed a large gang of them in the works of the General Electric Company, Schenectady, N. Y., where they are run by electric motors.

These are the best and most economical Rumblers ever made.

J. W. Paxson Co., 1021 North Delaware Avenue, PHILADELPHIA, PA., U. S. A.

Paxson Pulley Molding Machine.



ANY SIZE CAN BE MADE TO ORDER.

4 inch to 12 inch Machine.	48 inch to 60 inch Machine.
12 inch to 24 inch "	60 inch to 72 inch "
24 inch to 36 inch "	72 inch to 84 inch "
36 inch to 48 inch "	

This Machine will only make a *Flat* Face Pulley, but a Crown-Faced Pulley can be made by making a collar of required thickness and placed on the Pattern around the rim.

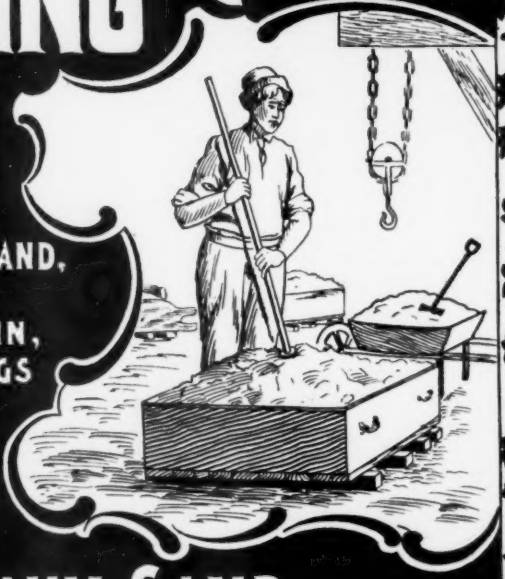
ASK FOR PRICES.

J. W. Paxson Co., 1021 North Delaware Ave., PHILADELPHIA, PA.

WHITEHEAD BROTHERS COMPANY.

MOLDING SAND

FIRE SAND,
PHILADELPHIA SAND,
FRENCH SAND,
FIRE CLAY KAOLIN,
FOUNDRY FACINGS
AND SUPPLIES
OF ALL KINDS.
LEAD FACINGS
A SPECIALTY.



ALBANY SAND FOR BRASS AND STOVE PLATE CASTINGS

527-39 WEST 27TH. ST.
NEW YORK.

PROVIDENCE OFFICE.
42 S. WATER ST.

BUFFALO OFFICE.
70 AND 72 COLUMBIA ST.

WORKS AT

CHEESEQUAKE CREEK, N. J.
SOUTH RIVER, N. J.
RARITON RIVER, N. J.
SOUTH AMBOY, N. J.
WAREHAM, MASS.
CENTRE ISLAND, L.I.
WATERFORD, N.Y.
ALBANY, N.Y.
CEDAR HILL, N.Y.
COXSACKIE, N.Y.
CLINTON POINT, N.Y.
ATHENS, N.Y.
COEYMANS, N.Y.
WILLOW SPRINGS, N.Y.
POUGHKEEPSIE, N.Y.
CRESCENT, N.Y.

This is the inside view of the Dixon Crucible shown last month. It was used in severe brass work and the boss molder pronounced it AA1—ideal in behavior and results. It gave full value to its user, wearing down gradually and on its 35th heat cracking on the rim under pressure of the tongs.

The inside shows up first class, and from its middle down is good for six more heats, which would make 40 heats.

For best results use Dixon's Crucibles.

Joseph Dixon Crucible Co.,

JERSEY CITY, N. J.

C. F. M. FOUNDERS' PERFECT WASH

A FEW MORE

FOUNDRY SUPPLIES

CORONA PLUMBAGO

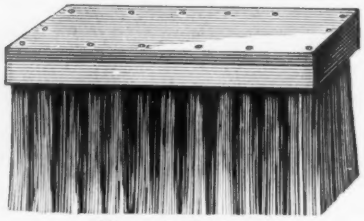


Fig. 17 in Catalogue.

Steel Wire Casting Brushes

ALL SIZES AT RIGHT PRICES.

The Cleveland Facing Mill Co.

FRANK H. CHAMBERLIN, Prop.

MANUFACTURE FOUNDRY { FACINGS SUPPLIES

CLEVELAND, O.

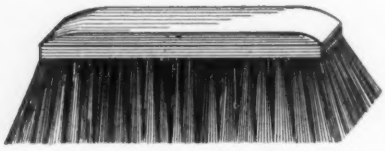


Fig. 28 in Catalogue.

Molders' Soft Brushes

BLOCK 10X2 IN. BRISTLES 3 IN. LONG.

PERFECTION CORE BOXES

SEND FOR CATALOGUE

CUPOLA BLOCKS

M. M. COCHRAN, PRES.
J. R. LAUGHREY, VICE-PRES.

JNO. H. WURTZ, SECY.-TREAS.
J. S. NEWMYER, MANAGER.

WASHINGTON COAL & COKE CO.

CAPITAL, PAID UP, $500,000.

3500 Acres of Coal. **5000 Tons Daily Capacity.**

350 COAL AND COKE CARS — 500 COKE OVENS.

Foundry Coke Our Specialty.

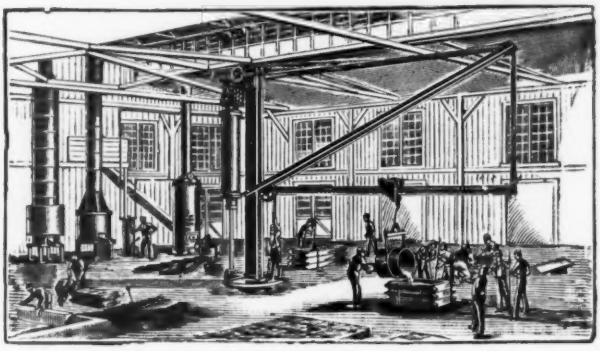
GENERAL OFFICE—
DAWSON, FAYETTE CO., PA.

SALES OFFICE—PITTSBURG, PA.
N. P. HYNDMAN, SALES AGENT.

"Say, Look Here, Ridgway"

"We had your cranes up at the Soandso Works, when I was General Manager there, and they saved us so much money that I want to get them here in this plant as soon as I can. I wish you would go through the works and make a note of the places where you can put your cranes to advantage. Then come back and see me."

This is exactly what the new General Manager of a large Iron and Steel Co. said to the writer the other day. Mighty good advertisement for Ridgway Cranes, isn't it? Well, we did as we were asked, we went through the works, and soon another big concern will be equipped with Ridgway money makers.

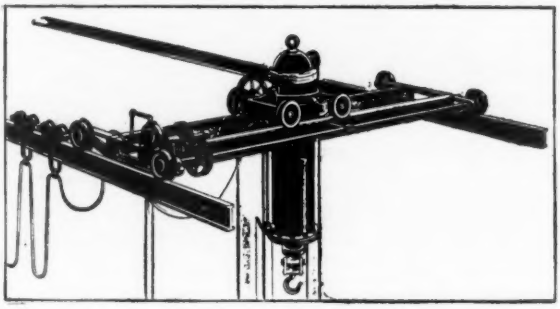


5-Ton Steam Hydraulic Crane in a foundry.

This, however, is no special case. Just happens to be the last one is why we mentioned it. This kind a' thing is happening right along all the time. As soon as a "Boss" who has used Ridgway Cranes moves to a new place the very first thing he asks for are Ridgway Cranes. The reason is not far to seek. He being a new man in the place naturally wants to please his superiors who own the pocket-book. Nothing pleases like increasing profits. When Ridgway Cranes are put in you ought to hear 'em say: "Our new man is just a Jim Dandy." Nothing increases profits and straightens out a plant like hitchin' the boiler to the lifting with a Ridgway Crane.

HYDRAULIC AIR HOISTS.

Yes, kill somebody, will you? An Air Gun to handle a ton with. Of course it is a man trap. Wait until you hurt or kill somebody and a jury gets a chance at you and you will see whether it pays to use dangerous air hoists because they are cheap and an Oil Governed absolutely safe hoist costs more money to build it. Workmen and lawyers are learning about Ridgway Hoists. You should be able to say you adopted the safest and best hoist you know. A word to the wise is sufficient.



"PLEASE TAKE THE ELEVATOR"

THEY ALL DO IT.

CRAIG RIDGWAY & SON CO., COATESVILLE, PA.

EUROPEAN AGENT,

CHAS. G. ECKSTEIN, 16 Spandauerstr., Berlin, Germany.

William Sellers & Co. Incorp.

PHILADELPHIA, PA.

Foundry Machinery.

Every Foundryman knows to his cost that machinery exposed to the dust, dirt and heat of a foundry, is subjected to very severe conditions of service, and unless it is properly designed "to stand the racket" will rapidly wear out.

Having operated Foundries in connection with our Machine Tool Works for half a century, we have had abundant opportunity to study this question in all its phases, both from the theoretical standpoint of the designer of such machinery, and from the practical standpoint of the user.

All of the labor saving appliances intended for use in Foundries, which we advertise in "THE FOUNDRY," and elsewhere, were designed primarily for our own use, and their good qualities were thoroughly tested by us in our own Foundries before offering them to the public.

We make **Foundry Jib Cranes** of iron frame work instead of wood, and without struts, thus being entirely clear of obstructions underneath. They are operated by electricity, steam, or other power, and have rapid motion in hoisting the load and in swinging.

We make **Traveling Cranes** which will lift the copes of the longest molds **absolutely vertically** and without jarring the sand. We make Cranes that lift the largest castings and transport them to any portion of the floor very expeditiously. The most perfect safety devices have been invented and applied to these Cranes, so that the load can never lower except at the will of the operator. All parts of the machinery are conveniently located for oiling, and for making necessary renewals or repairs.

Last, but not least, we make a **Centrifugal Sand Mixing Machine** which has literally worked a revolution in the method of preparing facing sand, molding sand and core sand in foundries wherever it has been introduced. "THE FOUNDRY" for April contains a list of a few of the recent purchasers of this remarkable labor saver in mixing sand, as well as improver of molding sand.

To those who are sufficiently interested in what we have here said to wish to know more, we will be pleased to send on application, illustrated booklets describing our jib and traveling Cranes and Centrifugal Sand Mixing Machine.

Over 15,000 in Use.

ALWAYS READY!

800 TO 2,000 CANDLE POWER.

ESPECIALLY ADAPTED FOR

FOUNDRIES

PORTABLE, SELF-CONTAINED AUTOMATIC.

NO SMOKE! NO SPRAY! NO SHARP SHADOWS!

Now in Valuable Use With Hundreds of Foundries,

In addition to 400 Railroads and over 500 Contractors.

REQUEST CIRCULARS FROM

THE WELLS LIGHT M'F'G. CO.,

EDWARD ROBINSON, Sole Proprietor.

44-46 WASHINGTON STREET, NEW YORK.

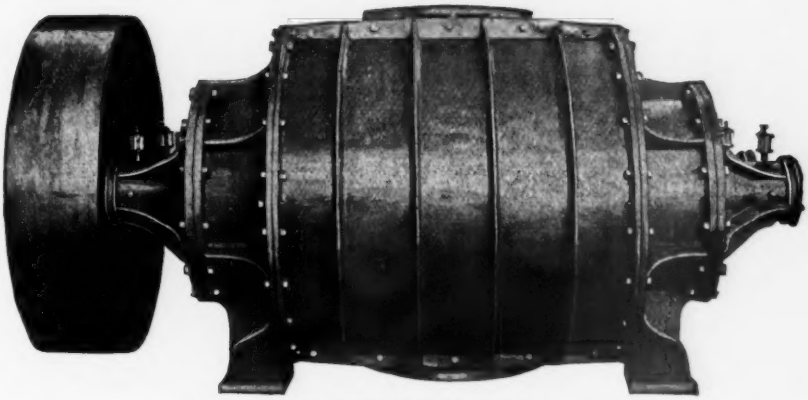
ROSS-MEEHAN FOUNDRY CO.
CHATTANOOGA, TENN., May 5, 1896.

The Wells Light M'f'g. Co., Nos. 44 and 46 Washington St., New York City:

GENTLEMEN—It is contrary to our rule to give testimonials, but an article with the merit of your Wells Light deserves to be made an exception. We have used your lights for the past five years, and consider them indispensable to us.

Yours very truly,
ROSS-MEEHAN FOUNDRY CO.
P. A. BRAWNER, JR., Sec'y, & Treas.

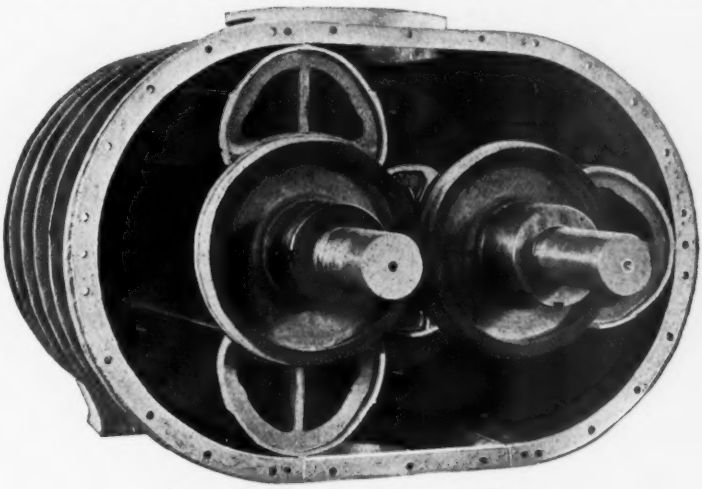
THE GREEN Rotary Pressure Blower



NEW CENTURY PATTERN.

YOU WILL SEE That the working parts are two perfectly balanced impellers mounted on forged steel shafts. They run in bronze bushings, detachable journal bearings and the cut gearing at both ends of the blower is enclosed in oil tight casings.

The Green Blower occupies less space and weighs less than any other Positive Blower in existence.



NEW CENTURY PATTERN—INTERIOR.

Foundry Blowers, High Pressure Blowers, Gas Exhausters, Exhausters for Hot Gases.

THE GREEN GIVES THE MOST VALUE FOR A $.

SEND FOR NEW CATALOGUE B.

Wilbraham Baker Blower Co.,

PHILADELPHIA, PA.

Sales Agents: FRAZER & CHALMERS, Inc., Chicago, Ill. and Branch Houses.

44-46 WASHINGTON STREET, NEW YORK.
P. A. BRAWNER, JR., Sec'y. & Treas.

Smooth-On Cements

In up-to-date foundry practice, the time has come when the intelligent use of an iron cement that will withstand fire, water and steam and stay where it is put, has become a shop necessity. A blemish on an iron casting may not injure it, but like a wart on a nose it looks ugly and should be removed. Just here is where Smooth-On Castings is valuable to the manufacturer in saving good castings and to the consumer in avoiding delays in procuring them. Don't use an inferior filling because it is cheap, but to do so is neither wise nor economical. Use only the best. Then with an expert, whose good judgment in the use and skill in the application, Smooth-On Castings saves time and money. Smooth-On Castings is useful for many other purposes, daily new uses are being discovered for it.

We make a Smooth-On Compound for Engineers and Steamfitters use, for making connections to withstand high temperatures and high pressures. Unequaled for making Flanged Joints and Boiler Patching.

We also make a special cement for connecting coils, for ammonia machines, for refrigeration. Write for Catalogues and Prices.

SMOOTH-ON MFG. CO.,

VREELAND TOMPKINS, CHEMIST AND MANAGER.

547-549 COMMUNIPAW AVENUE. JERSEY CITY, N. J., U. S. A.

This is the Home of the improved ribbed flask and others. The whole of this building is occupied by us. ***Foundry Specialties of every kind*** are here manufactured.

You should send for our 1900

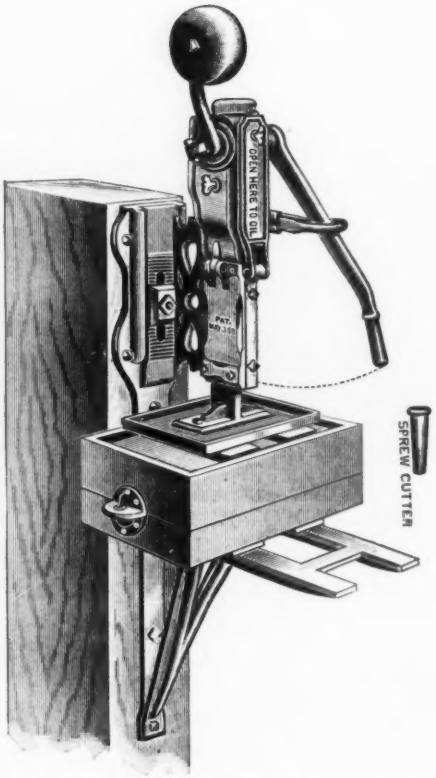
it describes goods you need every day.

The Brass Founders Supply Co., NEWARK, N. J. U. S. A.

W. B. BURNS'

Economic Molding Machine

SYRACUSE, N. Y.



The

QUICKEST Adjusted

EASIEST WORKED

and

Most POWERFUL

Machine on the market,

Giving a POSITIVE

UNIFORM Pressure.

No DUST can get to WORKING parts

WHICH ARE ALL ABOVE THE SAND PILE.

MANUFACTURED BY

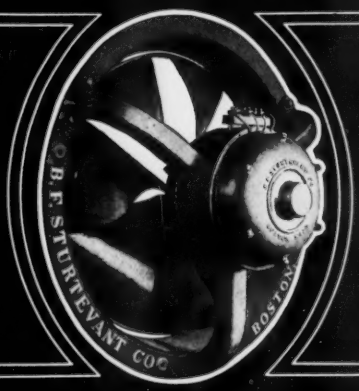
Syracuse Malleable Iron Works,

SYRACUSE, N. Y.

CORRESPONDENCE SOLICITED.

WARM
WEATHER
FANS

72



DUST PROOF ELECTRIC MOTORS
CARRIED IN STOCK
READY FOR OPERATION

B. F. STURTEVANT CO., Boston
New York Philadelphia Chicago London

The • Shops • are Becoming Larger

Every year the output is increased, heavier tools that turn out more work are installed. In order to secure the greatest output, provision must be made to speedily handle material as well as the finished product. Your shop may be covered with a heavy crane, but if your men have to wait for it at any time, your output is reduced.

The simplest way of keeping your employes from standing around, with their hands in **your** pockets, is to put in a few trolley tracks. These will keep everybody going. The first cost is low, there is nothing to get out of repairs.

The trolley track is always ready, it costs nothing for maintenance, and a single man will move as much stuff thereon as half a dozen men will do with ordinary methods.

Make a pencil sketch of your plant, showing how it is laid out and the principal dimensions, we will then give you an idea of what it will cost to displace half of your laboring force with a **Coburn Trolley Track.**

Coburn Trolley Track Mfg Co.

HOLYOKE, MASS., U. S. A.

"LITTLE GIANT"

Pneumatic Hammers

ARE ESPECIALLY DESIGNED FOR CHIPPING CASTINGS.

LIGHT. SIMPLE IN CONSTRUCTION.

DURABLE. EFFICIENT.

They have an air regulator which can be so adjusted as to admit a minimum amount of air and yet deliver a blow with full force of hammer under various pressures.

MADE IN ALL SIZES. Used in Foundries throughout the World.

SENT ON TRIAL. Guaranteed Against Repair for One Year.

SEND FOR CATALOGUE.

Standard Pneumatic Tool Co.,

Manufacturers Piston Air Drills, Boring Machines, Reversible Motor Chain Hoists, and all kinds of Pneumatic Tools and Appliances.

Main Office and Works, CHICAGO, U. S. A.

NEW YORK. LONDON. PARIS. BERLIN. ST. PETERSBURG

MOLDING SAND

ALL GRADES FOR ALL CLASSES OF CASTINGS

Give us a chance to quote prices thereon at your own town. :: :: **AYERS' SAND** has always received the highest recommendations for quality. :: :: ::

E. M. AYERS,

ZANESVILLE, OHIO.

WESTERN REPRESENTATIVE,

H. S. VROOMAN, 220 West 20th St., CHICAGO, ILL.

Are you satisfied with what you know?

If not read up a bit. Study the books written by such practical men as Thomas D. West, Simpson Bolland and Edward Kirk. The examples illustrated therein are taken right from the sand-heap. You can see the smoke of the shop right through them.

American Foundry Practice,	*$2.50*
Molders' Text Book,	*2.50*
The Iron Founder,	*2.50*
The Iron Founder Supplement,	*2.50*
Encyclopedia of Founding,	*3.00*
Metallurgy of Cast Iron,	*3.00*
The Cupola Furnace,	*3.50*

Make yourself a mechanic in your leisure hours. A dollar spent in self education comes back a hundred times. These books go to you on receipt of price. :: :: :: ::

The Foundry Publishing Co.,

DETROIT, MICH., U. S. A.

Don't get your back up because you are making money. You can make more by buying our

Specialties

Coreka A liquid core mixture used for dampening core sands for making cores without use of ***Rosin, Flour, Oil or Molasses.***

Standard Core Compound is a dry powder used to mix with core sands which with use of water to dampen same makes good cores without use of any other materials.

New Process Brass Molding Sand contains no vegetable matter. If you make fine Brass, Bronze, Gold, Aluminum, Silver or ornamental castings, and can't get them as perfect as you desire, use New Process Sand.

Standard Brass Facing Coats sand surface for return pattern work without sticking.

Eagle Filler For filling holes in iron and steel castings. It makes surfaces as smooth and hard as perfect castings.

Ajax Steel Core Coating A powder when mixed with Wood Alcohol coats steel cores ready for business.

Radiant Pattern Dressing Used with better success than Shellac or any pattern varnish for dressing and preserving iron and wood patterns. It evens the surfaces and prevents many difficulties in molding.

Plumbago and Silver Lead For all purposes.

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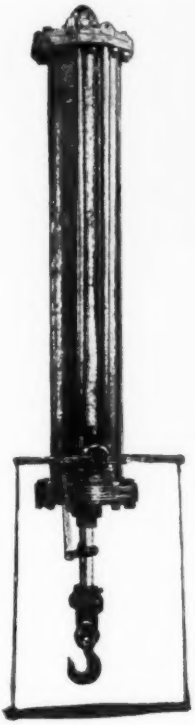

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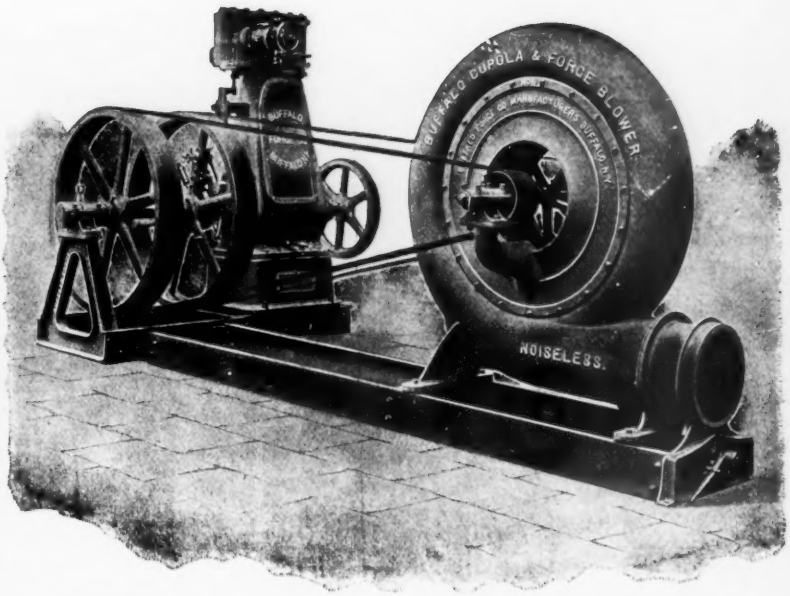

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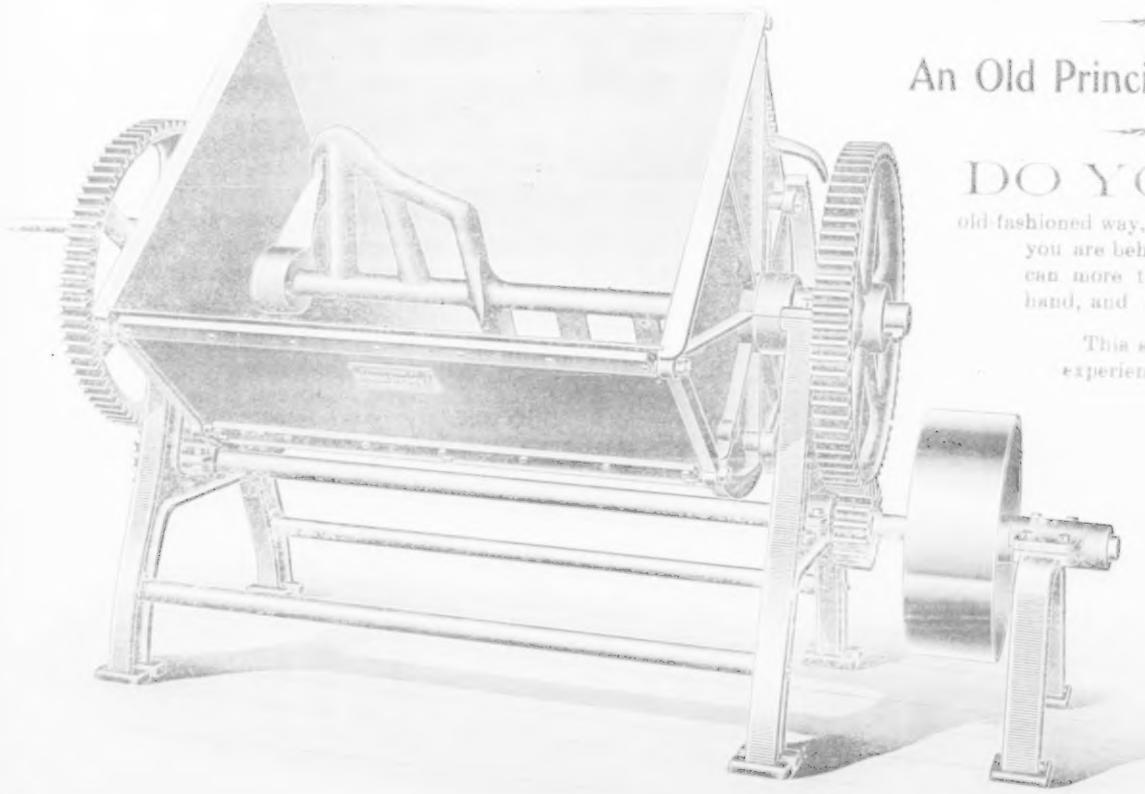

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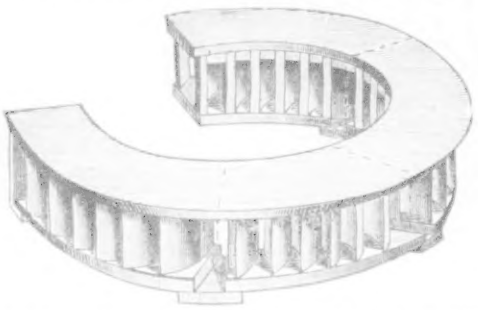

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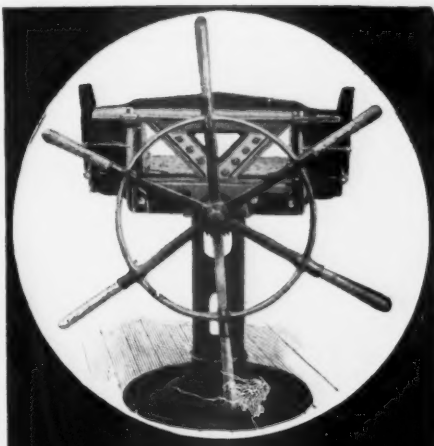

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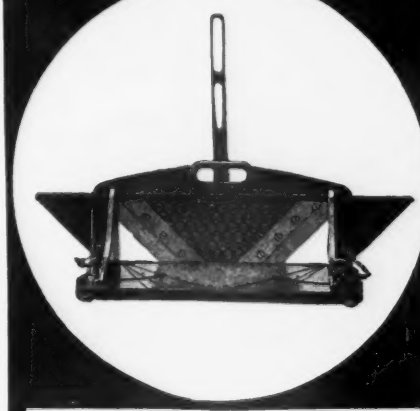

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We are desirous of publishing also in this book the analyses of pig iron made in Canada, Mexico and the Continent of Europe, and we will be obliged to any furnaces which will send us analyses of their pig irons, so that they will be represented in this publication.

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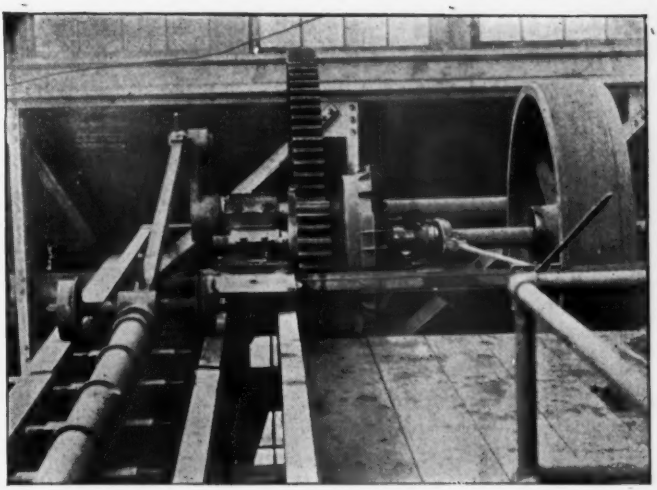

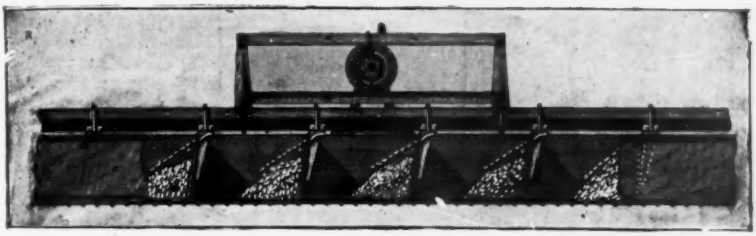

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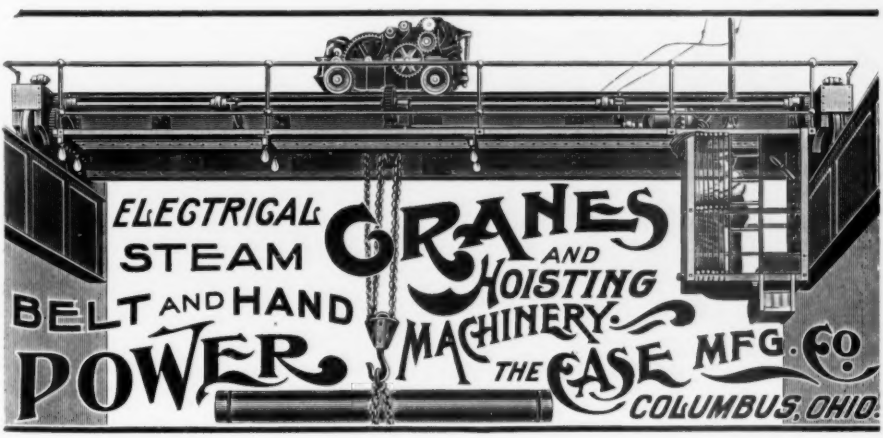
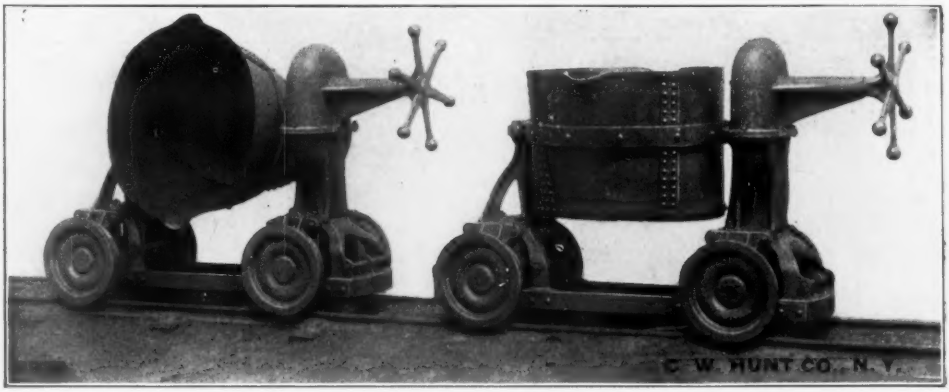
Chicago, Ill.





Ladle Cars, 1,500, 2,000, 3,000 Pounds Capacity.

Many foundrymen believe that these cars are not only more convenient to use in distributing molten metal, but are also safer than any overhead system of cranes or tackles. No accident has ever occurred in the use of these cars. The height of the top of the ladle above the rails, when upright, is 36 inches; for convenience in pouring into hand ladles, the shape of the body and the position of the trunnions are arranged so that the spout, when tipped, pours into a ladle 17 inches high. The gear for revolving the ladle, is our patent cam gear, that locks the ladle in every position, and possesses the remarkable feature of having both shafts revolve in the same direction. When the handles are moved, the ladle moves steadily in the same direction as the handles, but only one-twelfth as fast.

Our system of narrow-gauge tracks, switches, curves, turntables, etc., for use in manufacturing establishments and to accommodate such special cars as the above, is worthy of careful investigation by those who are apt to be interested. Catalogue No. 9904 contains useful data, besides thoroughly treating this subject. Copies will be mailed to those interested. Please address the works direct.

C. W. Hunt Company, Brad Street, **WEST NEW BRIGHTON, NEW YORK CITY.**

DON'T CHIP

By the old

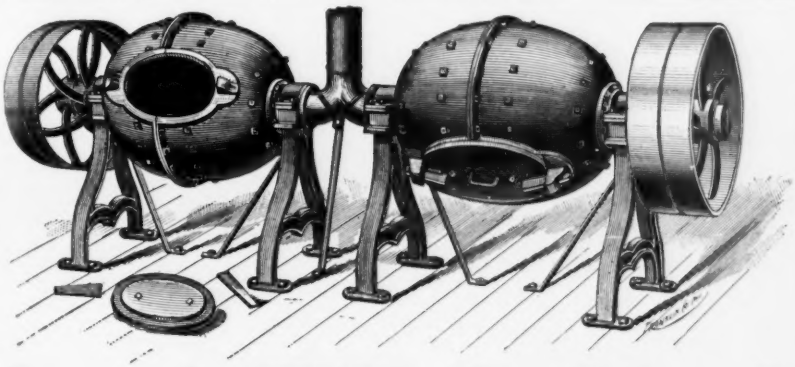
Hand Method

when you can do the work in one-fourth the time with our ***PNEUMATIC HAMMERS.*** It has the simplest valve yet designed and hence the least likely to get out of order. It cannot break or become inoperative through slight wear, and you can oil it throughout in an instant.

See last month's "Foundry" for details regarding our PNEUMATIC RAMMER.

PHILADELPHIA PNEUMATIC TOOL CO.,

PHILADELPHIA, 21 So. 12th Street — *NEW YORK, 149 Broadway.* — *BOSTON, Exchange Building.* — *PITTSBURGH, Wood and Water Sts.*



A Fine Pair

Stover's IMPROVED EXHAUST Tumbling Barrels

The Stover Egg Shaped Barrel does double the work of any other with less noise and power. It gives the contents a double motion or action—from ends to center and from side to center—causing a thorough mixing and rubbing together of all the parts contained therein, cleaning and polishing the contents better and quicker than any other form of barrel.

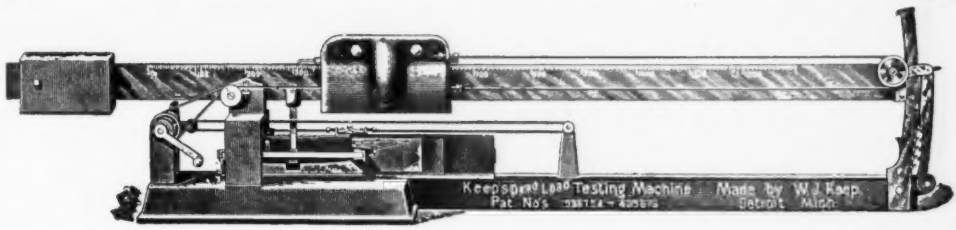
Sent on 30 days approval to any responsible manufacturer of light castings, malleable iron wire nails, or any other small articles that require cleaning and polishing.

For full particulars, address,

Stover Manufacturing Co.

205 RIVER STREET. FREEPORT, ILL

MECHANICAL ANALYSIS



The Only Practical Method for . . . . MAKING CASTINGS

OF A DESIRED QUALITY

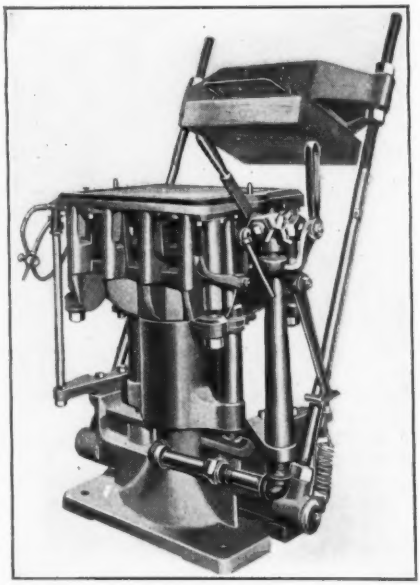
AT A LOW PRICE.

Send for Testimonials and for Description of

W. J. KEEP, Detroit, Mich.

KEEP'S TEST APPARATUS.

MOLDING MACHINES SUITED TO ANY CONDITION



Split Pattern Vibrator Machine.

The COST OF PATTERNS often overshadows THE COST of machines.

—WE USE—

1—Split Patterns simply fastened to surface of Pattern Plate and drawn by means of Vibrator.

ONE THIRD THE COST of Stripping Plates.

2—Entire GATED PATTERNS and SAND or other MATCHES.

No New Pattern Cost at all.

The Tabor Mfg. Co.

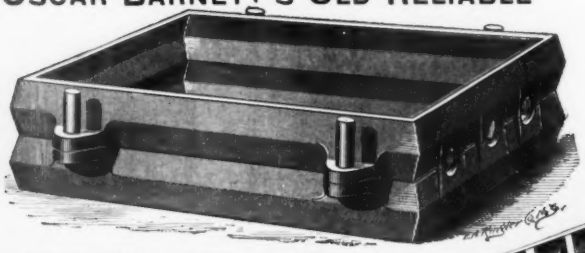
ELIZABETH, N. J.

L. D. PHONE 1045. Our Own Foundry Insures Prompt Shipments. FOUNDED IN "45.

Soft, Smooth Castings and Finished Hardware Specialties to Order.

Hardwood Bench Rammers, 35c PER PAIR F. O. B. Newark.

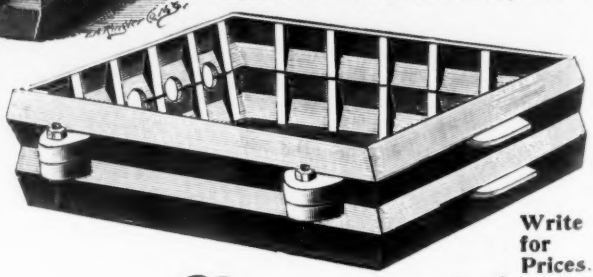
OSCAR BARNETT'S OLD RELIABLE



Ribs in Flasks increase weight and obstruct ramming—two important features. Do you want them? You are the Doctor.

SAME PRICE AS <STANDARD> BEVEL.

DEMAREST PATENT RIBBED, 1855.



<STANDARD> BEVEL FLASK.

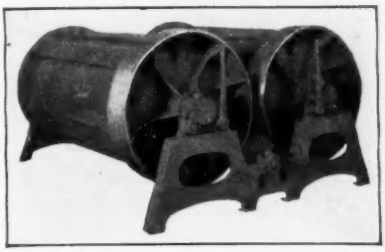
All Faces Level, Accurately Assembled, Guaranteed to Interchange Perfectly. Not Bored from Worn Flasks, but Hardened Steel Bushed Templets. Pins, Steel, 1-1000ths of an inch.

BRASS FOUNDRY SUPPLIES.

Write for Prices.

Oscar Barnett Foundry Co.,

NEWARK, N. J., U. S. A.



FOUNDRY TUMBLERS

New and practical designs. Made for hard and solid service. The kind that suits and keep on suiting. 18", 24", 30", 36", 42", any length for any duty.

NORTHERN ENGINEERING WORKS,

4 CHENE ST., DETROIT, MICH.

COMPRESSED AIR

Published monthly. Now in its fourth year. The only periodical devoted exclusively to this subject. It is both theoretical and practical, progressive and up-to-date. Subscription, $1.00 a year. Foreign, $1.50.

Send for sample copy.

COMPRESSED AIR,

26 Cortlandt Street, - N. Y.

WHEN YOU BUY A

Molding Machine

BUY THE BEST.

The McCormick Harvesting Machine Co.,

of Chicago, is now using over FOUR HUNDRED

"PRIDMORES"

and surely they know which machine is to be preferred. :: :: ::

MANUFACTURED BY

Henry E. Pridmore,

NINETEENTH AND ROCKWELL STS.,

CHICAGO, ILL.

THE BIG ITEM

In economical shop practice is the cost of labor. The man must not only do good work, but he must do lots of it—and the machine that enables him to accomplish this end is the one on which the profits are made.

CARBORUNDUM

saves money in just that way. Does better work, and more work to be sure, but it does'nt stop there—it does faster work than any other abrasive in the world.

There's proof of it, in plenty.
Shall we send it to you?

The Carborundum Company,

Niagara Falls, N. Y.

CORNELL'S CORE COMPOUND

Cornell's Core Compound

gives satisfaction wherever used. You should convince yourself of its merit by ordering a trial lot. :: :: ::

J. B. & J. M. CORNELL

NEW YORK CITY.

CLEVELAND
GALVANIZING WORKS,

CLEVELAND, OHIO.

General Galvanizing
AND
Machinists.

ALSO MANUFACTURERS OF

WHITE-METAL PATTERN LETTERS

IN ALL STYLES AND SIZES.

E E E E E

PUMP CHAIN, RUBBER BUCKETS, LIGHTNING ROD FIXTURES.

WRITE US FOR CATALOGUE, FOR ESTIMATES ON WORK, PRICES AND DISCOUNTS.

ESTABLISHED 1886

PROMPT ATTENTION ALWAYS.

A Good Opportunity

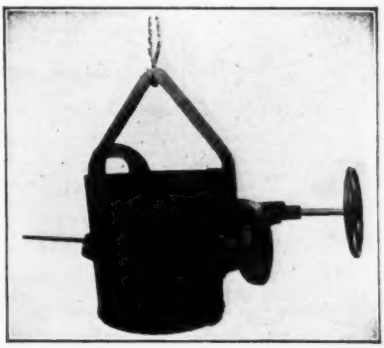
for a live man to step right into an established foundry and machine shop business, is offered in a town of 20,000 inhabitants, located in Wisconsin.

Transportation facilities are excellent. Besides being a lake port, there are four railroads entering the town.

The business has been established since 1868 and is in a paying condition.

A full chance is offered intending purchasers to investigate. Address,

FOUNDRY AND MACHINE SHOP,
Box 309, care The Foundry,
DETROIT.



GEARED LADLES

A full line of improved designs from one ton to thirty tons capacity. Well designed, well made. If you require a high grade article write us.

NORTHERN ENGINEERING WORKS,
4 CHENE ST., DETROIT, MICH.

Ask the man

who uses chaplets, whether he would rather use the misfit your blacksmith turns out or the perfect chaplet, which we make.

We make chaplets suited to all classes of castings. If you have any special casting in which cores require support, send us a sample or a sketch of same. We may be able to give you a pointer or two.

Of one thing rest assured we can sell you chaplets a great deal better and much cheaper than you can make them yourself.

... THE ...

Fanner Mfg. Co.,

Brookside Park,

CLEVELAND, OHIO.

Stove Trimmings, Stove Scrapers, Stove Rods, Stove Bolts.

Quality first-class and prompt shipment guaranteed. Catalogue and prices furnished on application.

Where To Locate?

WHY, IN THE TERRITORY TRAVERSED BY THE . . .

Louisville and Nashville Railroad,

The Great Central Southern Trunkline,

..IN..

KENTUCKY. TENNESSEE. ALABAMA. MISSISSIPPI, FLORIDA.

WHERE

Farmers, Fruit Growers,
Stock Raisers, Manufacturers,
Investors, Speculators
and Money Lenders

will find the greatest chances in the United States to make "big money" by reason of the abundance and cheapness of

LAND AND FARMS,
TIMBER AND STONE,
IRON AND COAL,
LABOR—EVERYTHING!

Free sites, financial assistance and freedom from taxation, for the manufacturer.

Land and farms at $1.00 per acre and upwards, and 500,000 acres in West Florida that can be taken gratis under U. S. Homestead laws.

Stockraising in the Gulf Coast District will make enormous profits.

HALF FARE EXCURSIONS THE FIRST AND THIRD TUESDAYS OF EACH MONTH.

Let us know what you want, and we will tell you where and how to get it—but don't delay, as the country is filling up rapidly.

Printed matter, maps and all information free. Address,

R. J. WEMYSS,
General Immigration and Industrial Agent,
LOUISVILLE, KY.

Do You Wish a Modern Core Room ?

Then you need Glutrose to make your CORES

American Glutrose Works

OFFICE AND FACTORY

12 and 14
George Street
Camden, N. J.

ESTABLISHED 1876.

STOW MANUF'G CO.,

BINGHAMTON, N. Y.

INVENTORS OF THE

FLEXIBLE SHAFT

FOR ALL PURPOSES.

The oldest and largest manufacturers in the world

PORTABLE EMERY GRINDER

Take the tool to the work and save heavy handling.

WRITE US FOR CATALOGUE AND PRICES

.. FOUNDRY ..

EQUIPMENTS.

Cupolas, Blowers, Ladles, Cranes, Molding Machines, Sand Sifters, Tumbling Barrels, Pan Grinders, Core Ovens, Gate Cutters.

FACINGS.

Plumbago, Blacking, Sea Coal, Soapstone, Stove Plate, Return, Mineral, Pipe Blacking, Car Wheel, Flour, Core Compound, Molasses, Rosin.

SUPPLIES.

Shovels, Coke Forks, Chaplets, Buckets, Clamps; Steel, Galvanized and Brass Riddles; Bellows; Soft and Hard, Camel's Hair, Bench, Wire and Circular Wire Brushes; Iron Filler, Bench and Floor Rammers; Molders' Tools, Pattern Letters and Figures; Leather and Wood Fillett; Wood and Rawhide Mallets; Snap and Brass Molders' Flasks, Crucibles, Crucible Tongs, Wheel Barrows, Pig Barrows, Sand Screens, Babbit Ladles, Emery Rub Stones.

SOLD BY **J. S. McCormick Co.,**

FOUNDRY SUPPLY HOUSE. PITTSBURG, PA.

Don't believe him

When that fire brick man tells you that a high priced brick with a high sounding name is the only brick for your cupola, **don't believe him.** Make him guarantee his brick to withstand the abrasion as well as the heat or don't try them. Our **"DOME" BRAND** of **CUPOLA BLOCKS** are the best made and are displacing the high priced blocks and furnishing far better results. Try them. We have been obliged to double our capacity, need we say more. Don't forget **we handle other bricks too** if you want them. Also, **Molding Sand, Loam, Etc.** Can we send you a sample? We can name you prices that will get your business. Try us.

CAN'T WE SEND YOU A SAMPLE?

GARDEN CITY SAND COMPANY,

188 Madison St., Chicago, Ill.

40 BRANDS **PIG IRON**

HIGH SILICON
FOUNDRY
FORGE

BESSEMER
MALLEABLE
CAR WHEEL

---

10 BRANDS **COKE**

72 HOUR FOUNDRY
48 HOUR FURNACE

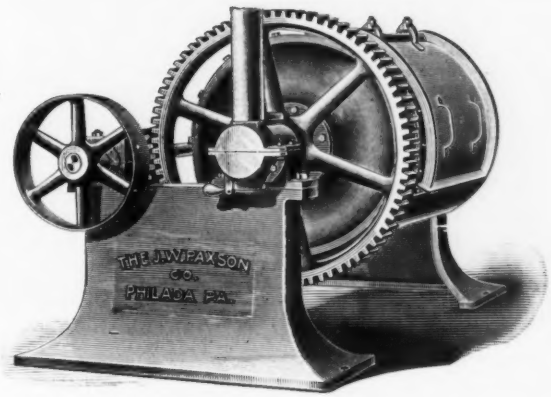
Inquiries are respectfully solicited.

Rogers, Brown & Co.

Cincinnati. New York. Chicago. Buffalo. Philadelphia.
Pittsburg. Cleveland. Boston. St. Louis. Birmingham.

Paxson Exhaust Rumblers

MADE OF STEEL.



MADE IN SIZES:

18	inch	diameter,	any	length	from	24	inch	to	48 inch.
24	"	"	"	"		30	"		48 "
30	"	"	"	"		36	"		54 "
36	"	"	"	"		36	"		54 "
40	"	"	"	"		36	"		60 "

No Cast Iron Staves

BUT

One Solid Sheet of Steel.

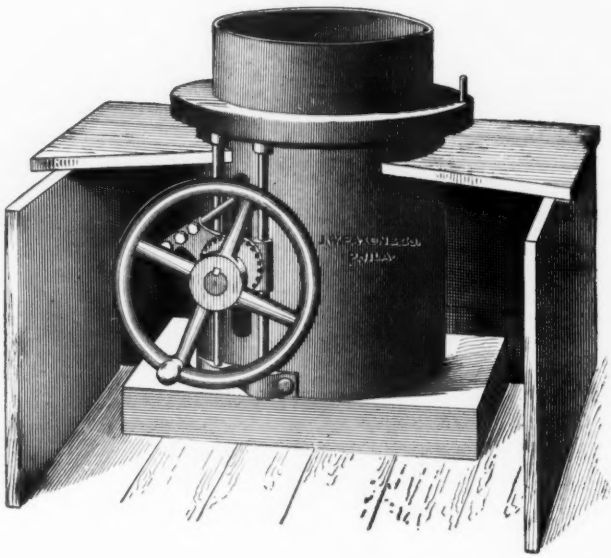
Wide Door Extends Full Length of Mill.
Ribs on Inside to Keep Castings from Slipping.

We have lately installed a large gang of them in the works of the General Electric Company, Schenectady, N. Y., where they are run by electric motors.

These are the best and most economical Rumblers ever made.

J. W. Paxson Co., 1021 North Delaware Avenue, PHILADELPHIA, PA., U. S. A.

Paxson Pulley Molding Machine.



ANY SIZE CAN BE MADE TO ORDER.

4 inch to 12 inch Machine.
12 inch to 24 inch "
24 inch to 36 inch "
36 inch to 48 inch "
48 inch to 60 inch Machine.
60 inch to 72 inch "
72 inch to 84 inch "

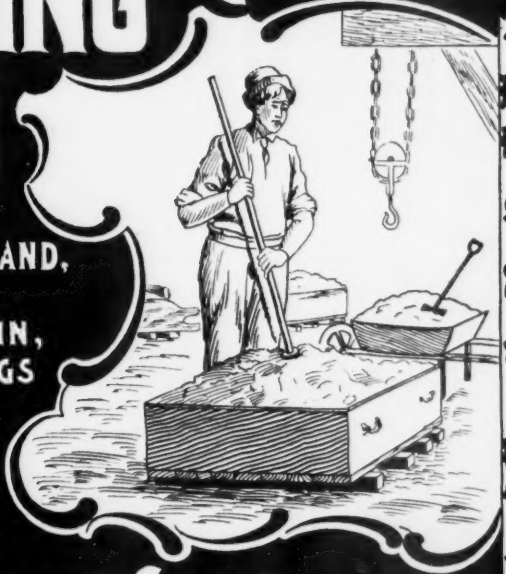
This Machine will only make a *Flat* Face Pulley, but a Crown-Faced Pulley can be made by making a collar of required thickness and placed on the Pattern around the rim.

ASK FOR PRICES.

J. W. Paxson Co., 1021 North Delaware Ave., PHILADELPHIA, PA.

WHITEHEAD BROTHERS MOLDING SAND COMPANY.

FIRE SAND,
PHILADELPHIA SAND,
FRENCH SAND,
FIRE CLAY KAOLIN,
FOUNDRY FACINGS
AND SUPPLIES
OF ALL KINDS.
LEAD FACINGS
A SPECIALTY.



ALBANY SAND FOR BRASS AND STOVE PLATE CASTINGS

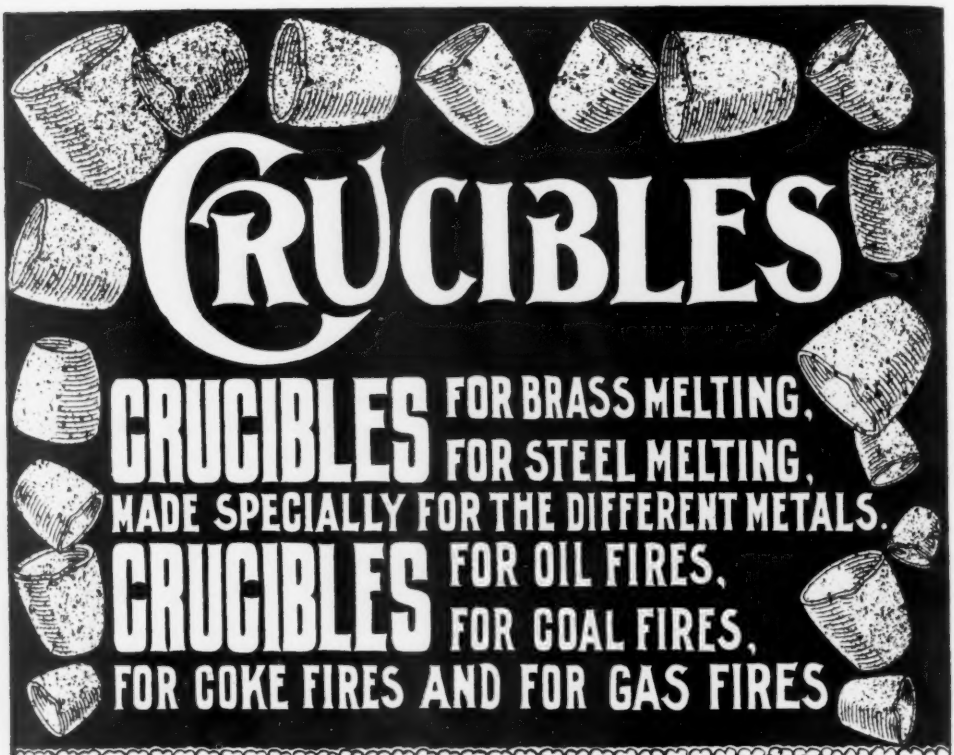
527-39 WEST 27TH. ST.
NEW YORK.

PROVIDENCE OFFICE.
42 S. WATER ST.

BUFFALO OFFICE.
70 AND 72 COLUMBIA ST.

WORKS AT

CHEESEQUAKE CREEK, N. J.
SOUTH RIVER, N. J.
RARITON RIVER, N. J.
SOUTH AMBOY, N. J.
WAREHAM, MASS.
CENTRE ISLAND, L.I.
WATERFORD, N.Y.
ALBANY, N.Y.
CEDAR HILL, N.Y.
COXSACKIE, N.Y.
CLINTON POINT, N.Y.
ATHENS, N.Y.
COEYMANS, N.Y.
WILLOW SPRINGS, N.Y.
POUGHKEEPSIE, N.Y.
CRESCENT, N.Y.


CRUCIBLES
CRUCIBLES FOR BRASS MELTING,
FOR STEEL MELTING,
MADE SPECIALLY FOR THE DIFFERENT METALS.
CRUCIBLES FOR OIL FIRES,
FOR COAL FIRES,
FOR COKE FIRES AND FOR GAS FIRES

PLATTSMOUTH, NEBR., May 18, 1900.

Joseph Dixon Crucible Company,

Gentlemen:—I notice in THE FOUNDRY for May, your ad. in which you call attention to a crucible that lasted 34 heats. That's nothing remarkable! I have a No. 70 Dixon pot in our foundry that has stood 48 heats of "Phosphor bronze," and is good for 4 or 6 more; as this metal is strictly 50% new stock, you will see that the heats of copper are pretty heavy.

We expect Crucibles with PROPER CARE to stand 36 heats at least, if they don't you would probably hear about it. Forty to forty-four heats is the regular thing, and once in a while we strike a pot that will stand 50 heats.

Yours truly

J. A. GUTSCHE, Foreman,
B. & M. R. R. Brass Foundry.

JOSEPH DIXON CRUCIBLE CO.
JERSEY CITY, N.J.

C. F. M.
FOUNDERS'
PERFECT
WASH

A FEW
MORE
FOUNDRY
SUPPLIES

CORONA
PLUMBAGO

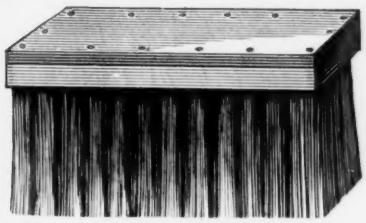


Fig. 17 in Catalogue.

Steel Wire
Casting Brushes

ALL SIZES AT RIGHT PRICES.

The Cleveland Facing Mill Co.

FRANK H. CHAMBERLIN, Prop.

MANUFACTURE FOUNDRY { FACINGS SUPPLIES CLEVELAND, O.

Molders'
Soft Brushes

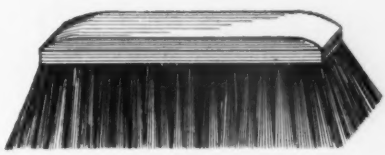


Fig. 28 in Catalogue.

BLOCK 10X2 IN. BRISTLES 3 IN. LONG.

PERFECTION
CORE
BOXES

SEND FOR
CATALOGUE

CUPOLA
BLOCKS

ALBANY FACING MILL CO.

MANUFACTURERS OF

CEYLON LEAD

Silver Lead, German Lead, Stove Plate, Return and Pine Limb Charcoal, Sea-coal and Soapstone Facings.

STOVE PUTTY

Shovels, Riddles and Brushes.

Our prices and goods are the best.
Write for them.

Albany Facing Mill Co.,

ALBANY, N. Y.

M. M. COCHRAN, PRES.
W. HARRY BROWN, V-PRES.

JNO H. WURTZ, SECY.-TREAS.
J. S. NEWMYER, MANAGER.

WASHINGTON COAL & COKE CO.

CAPITAL, PAID UP, $500,000.

3500 Acres of Coal. **5000 Tons Daily Capacity.**

350 COAL AND COKE CARS — 500 COKE OVENS.

Foundry Coke Our Specialty.

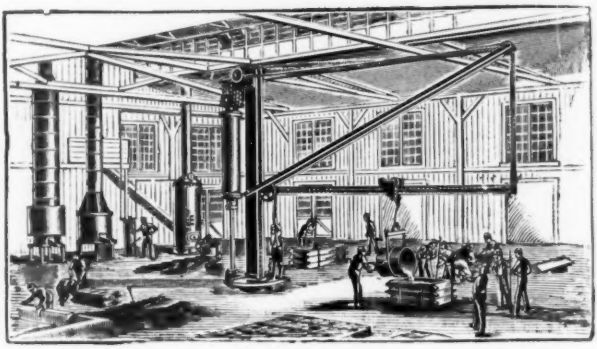
GENERAL OFFICE—
DAWSON, FAYETTE CO., PA.

SALES OFFICE—PITTSBURG, PA.
N. P. HYNDMAN, SALES AGENT.

A Hitchin' to the Liftin'

Of that boiler of yours out there is the best and quickest way to make money that we know. The steam that will be used is too trifling to take into serious consideration and would never be missed.

"Liftin' and hossin'" things around by main strength and awkwardness is always expensive business—and is the very top notch of folly when you have a boiler out there full of steam just itchin' for a hitchin' to the liftin', as a poet might say.



5-Ton Steam Hydraulic Crane in a foundry.

The Ridgway Steam Hydraulic Cranes and Elevators in their dozens of modifications are the machines with which this hitchin' up of the boiler may be done at very small cost for installation and nothing at all for maintenance.

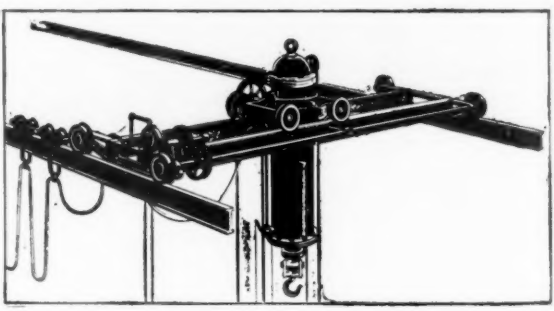
Did you ever see a Ridgway machine at work? Nicest working machine you ever saw, noiseless, gentle and quick as lightning.

Did you ever meet a man who was using any of the Ridgway machines? If you never have, just wait until you do and you will have to say that as a salesman we are not in it. Lots of our customers can tell you about Ridgway Cranes and Elevators more convincingly than this advertisement writer can do it. It is one of the funny things that everybody who get Ridgway machines are so enthusiastic.

All we have to do is to get people to know about Ridgway Cranes and Elevators and then the business is done. When the crane and elevator matter comes up there is only one word, "The Ridgway machine is the only thing to get—see how quick you can get it, for they are always busy."

HYDRAULIC AIR HOISTS.

Don't buy air guns for air hoists just because it is so cheap to buy a piece of pipe and stick a cold rolled shaft into it and so can be sold for a song at 200 per cent. profit. You will kill somebody, and when you get through with the expense of doctors, lawyers and the like may be they won't be so cheap. The Ridgway perfected, oil-governed air hoist is an expensive thing to build and costs more than other hoists, but when the "show is over" you will find it cheapest, ten to one.



"PLEASE TAKE THE ELEVATOR"

LIKE ALL SENSIBLE FOLK.

CRAIG RIDGWAY & SON CO., COATESVILLE, PA.

EUROPEAN AGENT,

CHAS. G. ECKSTEIN, 16 Spandauerstr., Berlin, Germany.

William Sellers & Co. Incorp.

PHILADELPHIA, PA.

Foundry Machinery.

Every Foundryman knows to his cost that machinery exposed to the dust, dirt and heat of a foundry, is subjected to very severe conditions of service, and unless it is properly designed "to stand the racket" will rapidly wear out.

Having operated Foundries in connection with our Machine Tool Works for half a century, we have had abundant opportunity to study this question in all its phases, both from the theoretical standpoint of the designer of such machinery, and from the practical standpoint of the user.

All of the labor saving appliances intended for use in Foundries, which we advertise in "THE FOUNDRY," and elsewhere, were designed primarily for our own use, and their good qualities were thoroughly tested by us in our own Foundries before offering them to the public.

We make **Foundry Jib Cranes** of iron frame work instead of wood, and without struts, thus being entirely clear of obstructions underneath. They are operated by electricity, steam, or other power, and have rapid motion in hoisting the load and in swinging.

We make **Traveling Cranes** which will lift the copes of the longest molds **absolutely vertically** and without jarring the sand. We make Cranes that lift the largest castings and transport them to any portion of the floor very expeditiously. The most perfect safety devices have been invented and applied to these Cranes, so that the load can never lower except at the will of the operator. All parts of the machinery are conveniently located for oiling, and for making necessary renewals or repairs.

Last, but not least, we make a **Centrifugal Sand Mixing Machine** which has literally worked a revolution in the method of preparing facing sand, molding sand and core sand in foundries wherever it has been introduced. "THE FOUNDRY" for April contains a list of a few of the recent purchasers of this remarkable labor saver in mixing sand, as well as improver of molding sand.

To those who are sufficiently interested in what we have here said to wish to know more, we will be pleased to send on application, illustrated booklets describing our jib and traveling Cranes and Centrifugal Sand Mixing Machine.

Over 15,000 in Use.

ALWAYS READY!

800 TO 2,000 CANDLE POWER.

ESPECIALLY ADAPTED FOR

FOUNDRIES

PORTABLE, SELF-CONTAINED AUTOMATIC.

NO SMOKE! NO SPRAY! NO SHARP SHADOWS!

Now in Valuable Use With Hundreds of Foundries,

In addition to 400 Railroads and over 500 Contractors.

ROSS-MEEHAN FOUNDRY CO.
CHATTANOOGA, TENN., May 5, 1896.

The Wells Light M'f'g. Co., Nos. 44 and 46 Washington St., New York City:

GENTLEMEN—It is contrary to our rule to give testimonials, but an article with the merit of your Wells Light deserves to be made an exception. We have used your lights for the past five years, and consider them indispensable to us.

Yours very truly,
ROSS-MEEHAN FOUNDRY CO.
P. A. BRAWNER, JR., Sec'y. & Treas.

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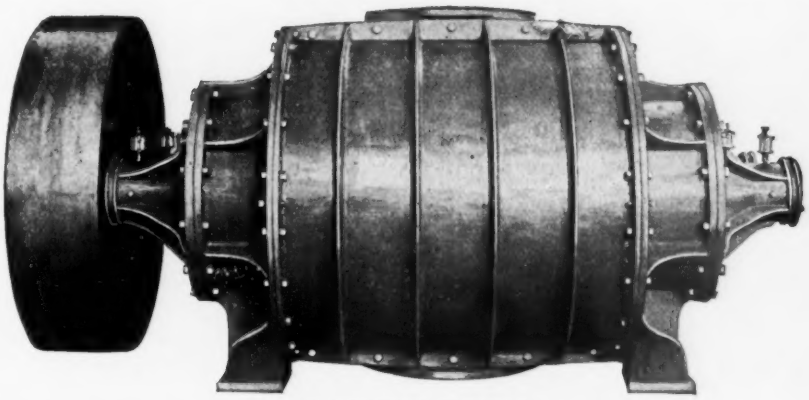
THE WELLS LIGHT M'F'G. CO.,

EDWARD ROBINSON, Sole Proprietor.

44-46 WASHINGTON STREET, NEW YORK.

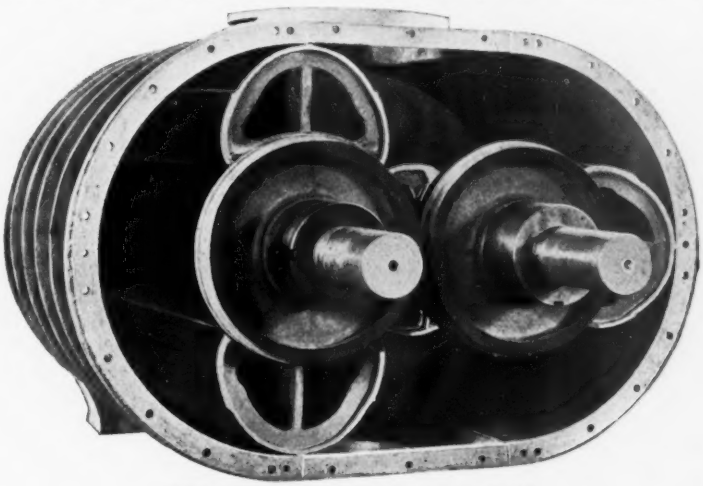
THE GREEN Rotary Pressure Blower



NEW CENTURY PATTERN.

YOU WILL SEE That the working parts are two perfectly balanced impellers mounted on forged steel shafts. They run in bronze bushings, detachable journal bearings and the cut gearing at both ends of the blower is enclosed in oil tight casings.

The Green Blower occupies less space and weighs less than any other Positive Blower in existence.



NEW CENTURY PATTERN—INTERIOR.

Foundry Blowers, High Pressure Blowers, Gas Exhausters, Exhausters for Hot Gases.

THE GREEN GIVES THE MOST VALUE FOR A $.

SEND FOR NEW CATALOGUE B.

Wilbraham Baker Blower Co.,

PHILADELPHIA, PA.

Sales Agents: FRAZER & CHALMERS, Inc., Chicago, Ill. and Branch Houses.

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ROSS-MEEHAN FOUNDRY CO.
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Smooth-On Cements

In up-to-date foundry practice, the time has come when the intelligent use of an iron cement that will withstand fire, water and steam and stay where it is put, has become a shop necessity. A blemish on an iron casting may not injure it, but like a wart on a nose it looks ugly and should be removed. Just here is where Smooth-On Castings is valuable to the manufacturer in saving good castings and to the consumer in avoiding delays in procuring them. Don't use an inferior filling because it is cheap, to do so is neither wise nor economical. Use only the best. Then with an expert, whose good judgment in the use and skill in the application, Smooth-On Castings saves time and money. Smooth-On Castings is useful for many other purposes, daily new uses are being discovered for it.

We make a Smooth-On Compound for Engineers and Steamfitters use, for making connections to withstand high temperatures and high pressures. Unequaled for making Flanged Joints and Boiler Patching.

We also make a special cement for connecting coils, for ammonia machines, for refrigeration. Write for Catalogues and Prices.

SMOOTH-ON MFG. CO.,

VREELAND TOMPKINS, CHEMIST AND MANAGER.

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This is the Home of the improved ribbed flask and others. The whole of this building is occupied by us. ***Foundry Specialties of every kind*** are here manufactured.

You should send for our 1900

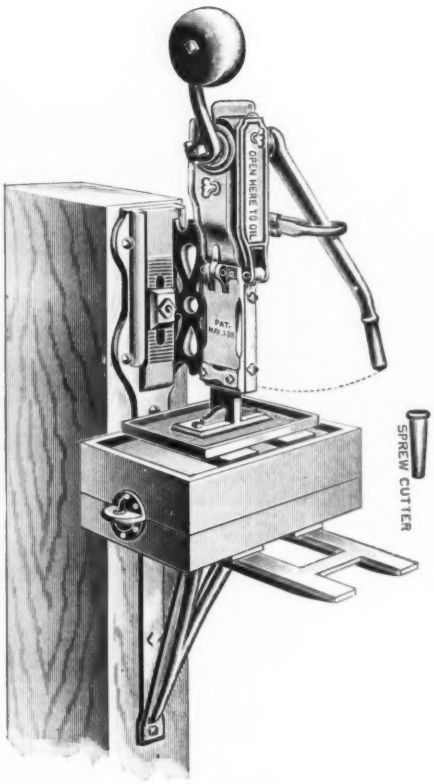
it describes goods you need every day.

The Brass Founders Supply Co., NEWARK, N. J. U. S. A.

W. B. BURNS'

Economic Molding Machine

SYRACUSE, N. Y.



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QUICKEST Adjusted

EASIEST WORKED

and

Most POWERFUL

Machine on the market,

Giving a POSITIVE

UNIFORM Pressure.

No DUST can get to WORKING parts

WHICH ARE ALL ABOVE THE SAND PILE.

MANUFACTURED BY

Syracuse Malleable Iron Works,

SYRACUSE, N. Y.

CORRESPONDENCE SOLICITED.

ROOTS'

BLOWERS

There are Brier ROOTS
Cube ROOTS
Square ROOTS

BUT ONLY ONE

P. H. & F. M. ROOTS

ALWAYS THE STANDARD.
OTHERS IMITATE, BUT NEVER EQUAL.

Forty years' experience boiled down to the most modern *Pressure Blower* in design and workmanship.

THE ROOTS obtains the *minimum of friction* and the *maximum of efficiency*. Others do not—cannot.

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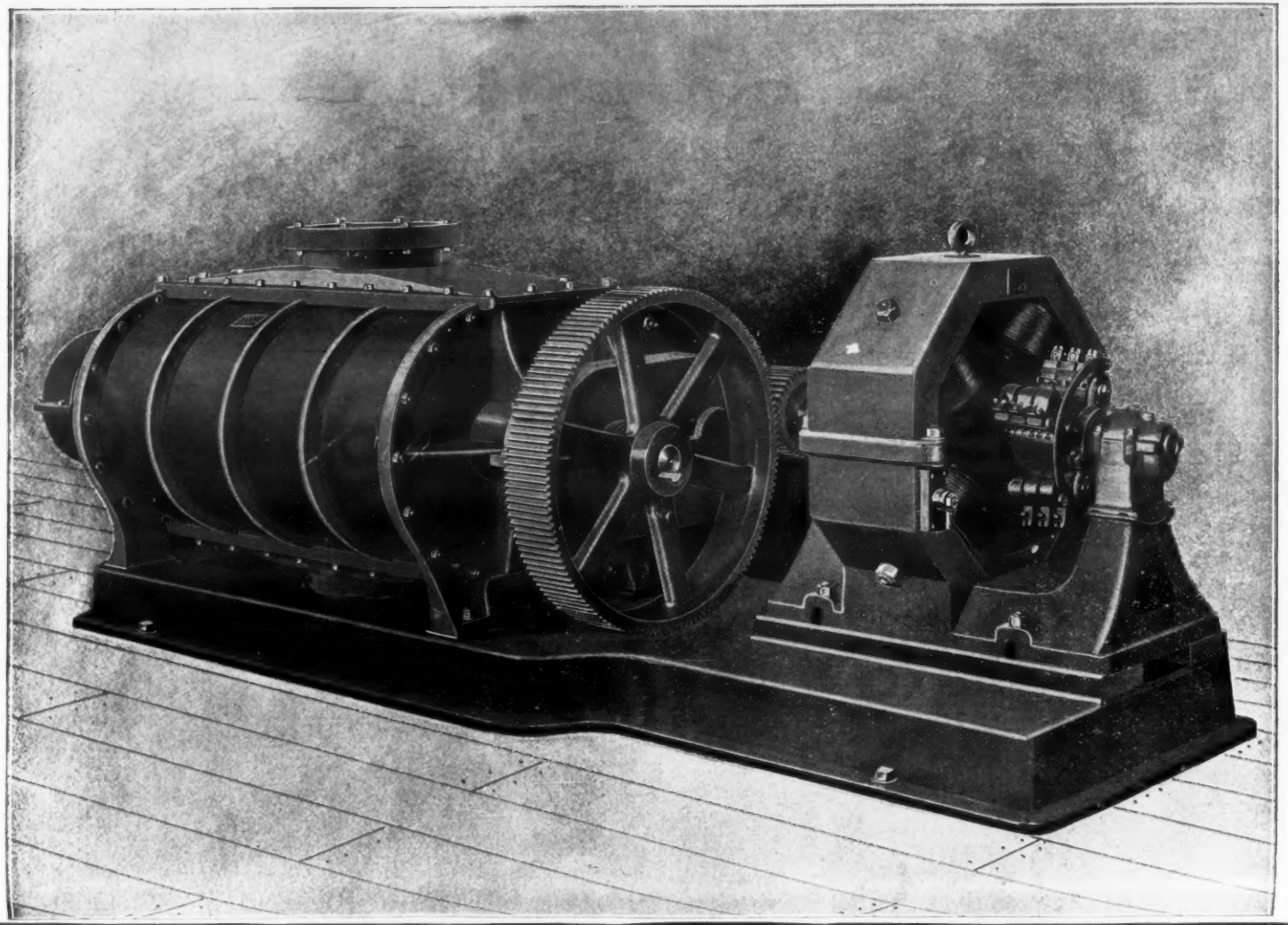

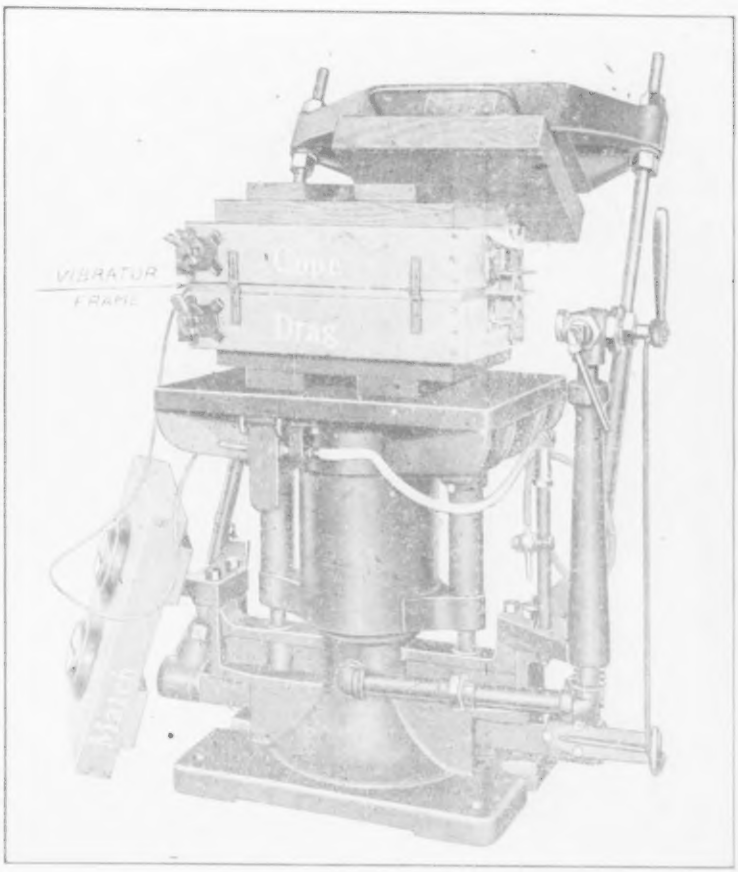

Vibrator Frame Molding Machine

THIS machine rams by power; draws patterns with a machine guide; vibrates the patterns but does not move them; rolls the mold over, leaving all hanging sand down in the drag, thus making very shallow drags possible.

Patterns on this machine cost practically nothing, as no change from metal patterns already in use is required.

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THE TABOR MANUFACTURING CO., ELIZABETH, N. J.

Are you satisfied with what you know?

If not read up a bit. Study the books written by such practical men as Thomas D. West, Simpson Bolland and Edward Kirk. The examples illustrated therein are taken right from the sand-heap. You can see the smoke of the shop right through them.

American Foundry Practice,	$2.50
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The Iron Founder,	2.50
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Encyclopedia of Founding,	3.00
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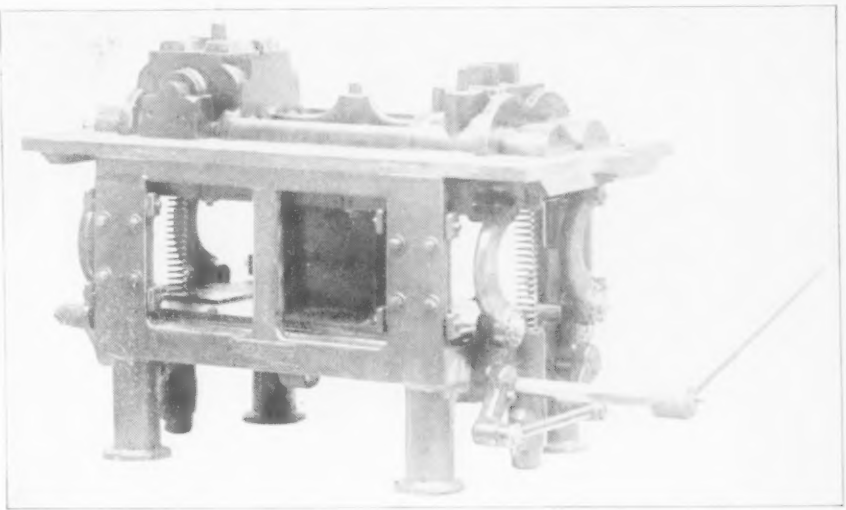
Make yourself a mechanic in your leisure hours. A dollar spent in self education comes back a hundred times. These books go to you on receipt of price.

The Foundry Publishing Co.

DETROIT, MICH., U. S. A.

PRIDMORE

Sand Molding Machines



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One Hundred and Fifty Regular Sizes.

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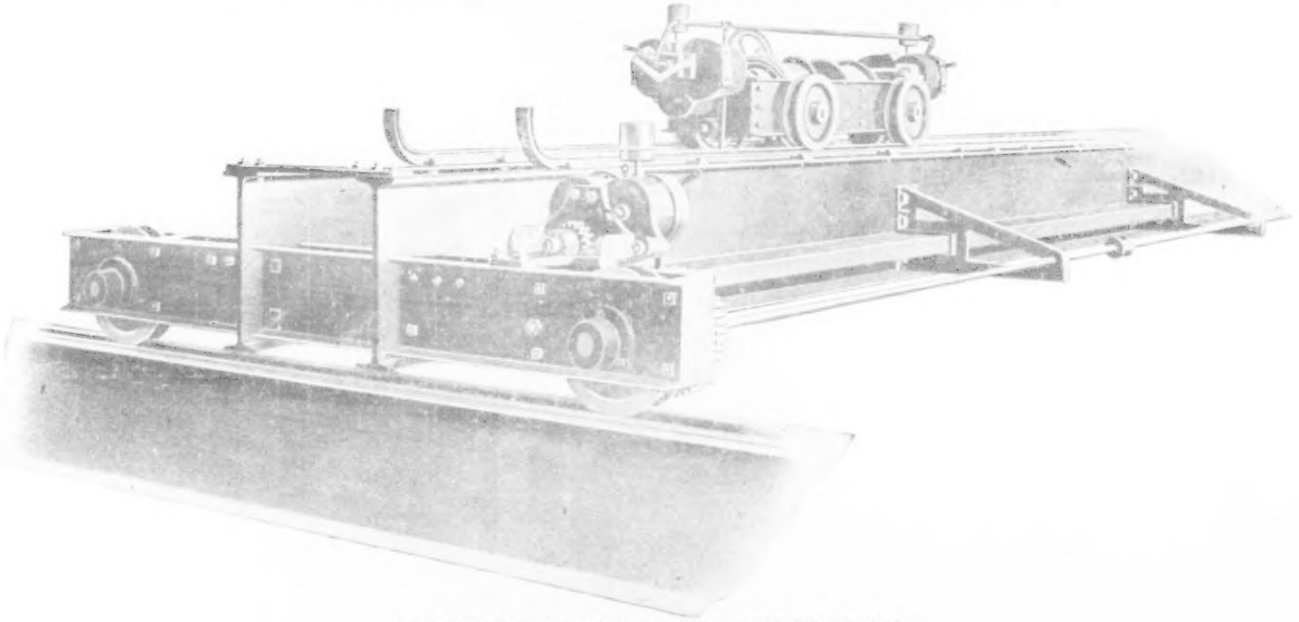
THE "MOORE" PNEUMATIC CRANE

FOR FOUNDRY AND MACHINE SHOP USE.



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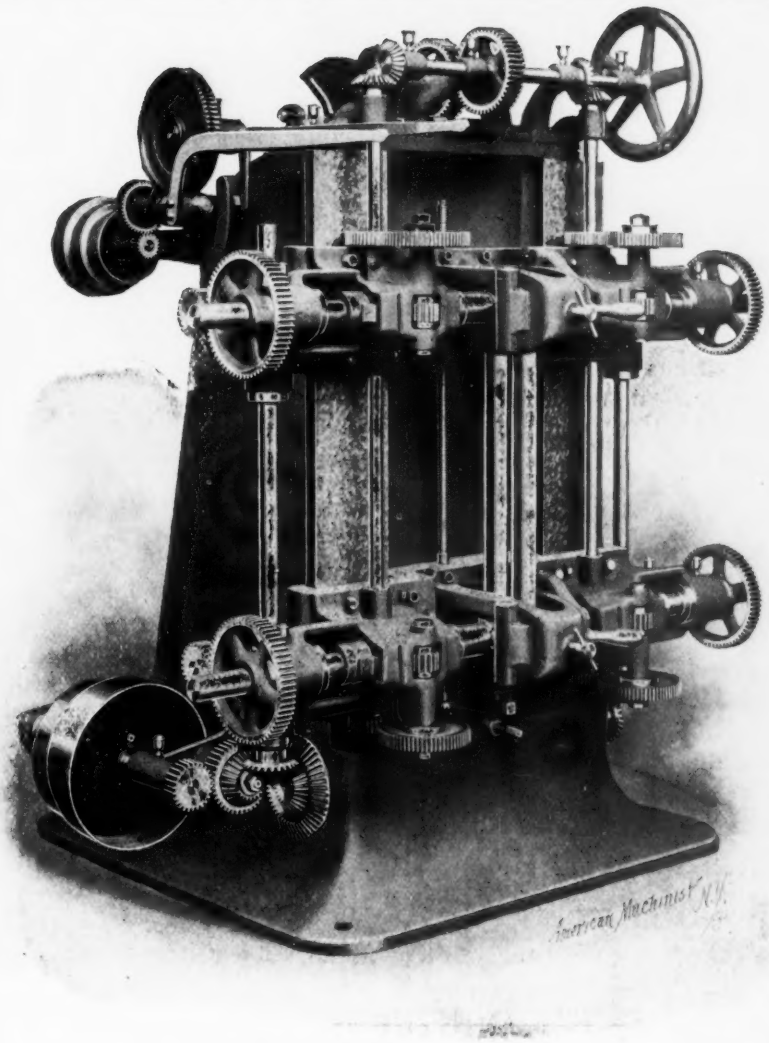
The Chisholm & Moore Mfg. Co., CLEVELAND, OHIO.



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in our line, the building of drilling machinery. We have been at it for 25 years and our latest production is a four spindle radiator drill that will bore and face 600 loops per day. Entirely automatic. Operator has only to put in and take out the work. Send for our new catalog which also describes a four and a six spindle heater section drill.

The Bickford Drill & Tool Company,

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CHICAGO PNEUMATIC TOOL CO.

Pneumatic Tools in designs and sizes for **Foundry Work.**
Our Customers say: "They go beyond guarantee."

One man does the work of four with our :: :: :: :: ::

Chipping Hammers

For drilling, reaming and tapping use our :: :: :: ::

AIR DRILLS . . .

They are especially valuable on heavy work not readily put under your drill press, and drill and ream up to 3 inches in diameter in iron and steel. :: :: :: :: :: ::

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We send our tools on trial subject to approval. :: ::

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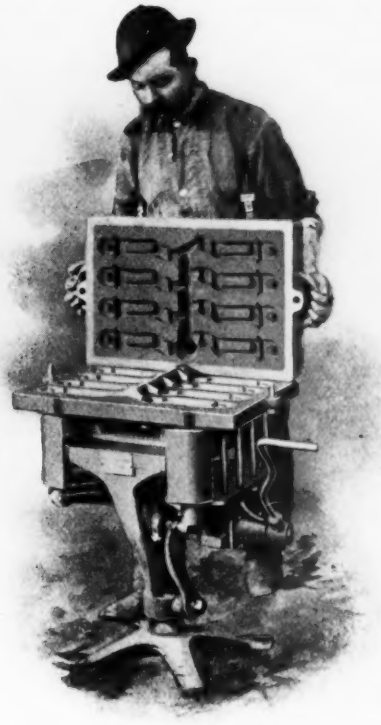
More Advance

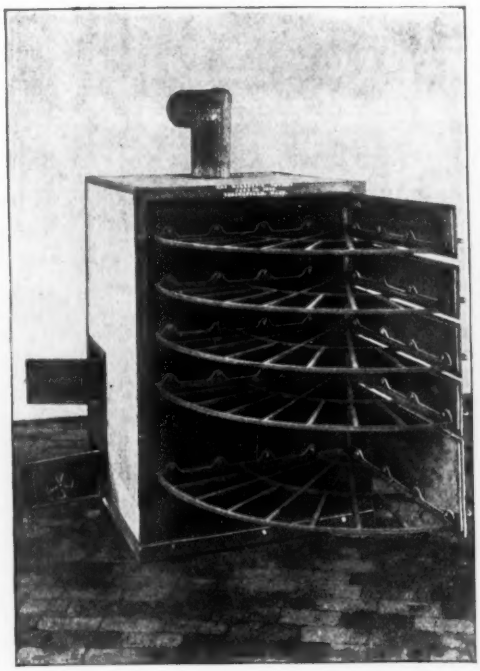
Has been made in the construction of Molding Machines within the last five years than in any previous period. The squeezer and the big clumsy machine are giving way to more simple and perfect machines. Having had many years' experience with different Molding Machines, we have, in our present designs, avoided the features which make other machines imperfect. Before building a machine we spend some little time studying out the particular points of the casting which it is to make. The result is that when our machine reaches the foundry it gets right down to business. It is built for the job and does it. Avoid stock machines which are claimed to be elastic enough to suit all jobs. Such machines are neither economical in operation nor perfect in the quality of their product. Send us a sketch of some of the castings you make in great numbers. We will tell just what our machine will be able to do on the same jobs. When you get our estimate you can judge for yourself whether you want to continue hand work. It will cost you nothing to ascertain this.



Maywood Foundry and Machine Co.

MAYWOOD, ILL.

Half of the Time



when you are blaming your coremakers for poor cores you should blame yourself. You have not given them facilities for doing their work right. That black hole you call a core oven is at the bottom of your troubles. When you want to see how a core is coming along you have to open that big door, your cores stop drying, and the first thing you know that something is wrong is when the metal sputters and blows.

Now with the **Millett Core Oven** you can examine a core any time you want to without interfering with the oven. When you pull out a shelf, a door at the back closes the opening automatically. With a **Millett Core Oven** in your foundry there is no excuse for having cores that are not what they should be. For your own good you should get one.

We have just had printed a nice new Illustrated Catalogue. **Want One?**

Millett Core Oven Co.

BRIGHTWOOD, MASS., U. S. A.

On Exhibition at and for sale by { *THE S. OBERMAYER CO., Cincinnati and Chicago.* / *THE J. W. PAXSON CO., Philadelphia.*

J. W. JACKMAN & CO., 39 Victoria St., London, S. W., Eng.

SOMETHING COOLING
FOR
A HOT DAY

IS A
STURTEVANT ELECTRIC FAN
Shipped Ready for Operation upon Receipt of Order

B. F. STURTEVANT CO., Boston
New York Philadelphia Chicago London
71

If the Owners

Of foundries had to push a wheelbarrow or carry iron from one end of the shop to the other themselves they would soon discover that there is a better and more economical way of doing such things. As it is many a proprietor goes down in his pocket every week for about twice as much money to pay laborers for pushing things around in his shop, as he would have to do with proper arrangements.

Too many foundrymen think that because they have cranes to handle heavy work they are well equipped. As a matter of fact a big heavy crane is too slow and too expensive a machine to be kept traveling from one end of the shop to the other with little things.

The Coburn Trolley Track is the ideal method of handling and transporting anything which enters and leaves a foundry. It is better than a track on the ground, because it is in nobody's way and there is nothing to block it. It keeps itself clear of obstructions, costs nothing for maintenance and even the first outlay is very low.

Write us for a list of people who are at present using our trolley track. They are now getting along with about fifty per cent. less roustabout labor. You would very likely be able to do as well.

By furnishing us with a rough plan of your works we will be able to tell you what it will cost to do this.

Coburn Trolley Track Mfg Co.

HOLYOKE, MASS., U. S. A.

"LITTLE GIANT"

Pneumatic Hammers

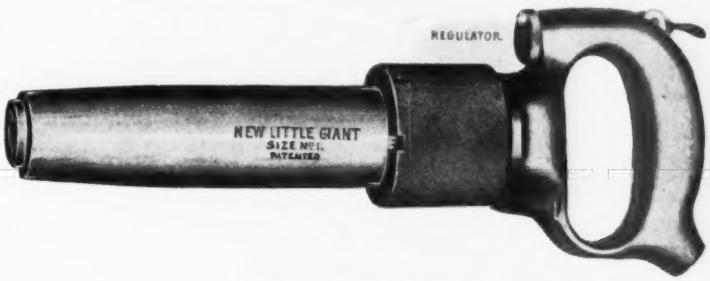
ARE ESPECIALLY DESIGNED FOR CHIPPING CASTINGS.

LIGHT. SIMPLE IN CONSTRUCTION.

DURABLE. EFFICIENT.

They have an air regulator which can be so adjusted as to admit a minimum amount of air and yet deliver a blow with full force of hammer under various pressures.

MADE IN ALL SIZES. Used in Foundries throughout the World.



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Ayers is Digging Sand

Just like he has been doing for a great many years. The quality is alway the very best and uniform. The supply is plentiful. The freight rate to to all parts of the Country is low. There is no experimenting about the Zanesville Sand. Its long life under hard use is proverbial. The smooth castings turned out with Ayers sand are the standard for finish. It's the **Sand** that does it.

May we have a chance to quote you prices on your seasons supply.

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INVENTORS AND LARGEST MANUFACTURERS IN THE WORLD OF THE

STOW FLEXIBLE SHAFT FOR ALL PURPOSES

For Grinding heavy Castings why not take the TOOL to the WORK instead of the WORK to the TOOL?

PORTABLE EMERY GRINDER.

It is one of the most popular tools we manufacture, many hundreds of them in daily use. For casting cleaning and grinding, buffing and polishing all metals, it has no equal. Write for Catalogue and prices.

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WITH

Rubber Tips

REDUCE THE COST OF PATTERN REPAIRS

They Do Not Mar the Pattern

Molds can be made as hard as with the ordinary rammer.

Tips can be easily replaced when worn.

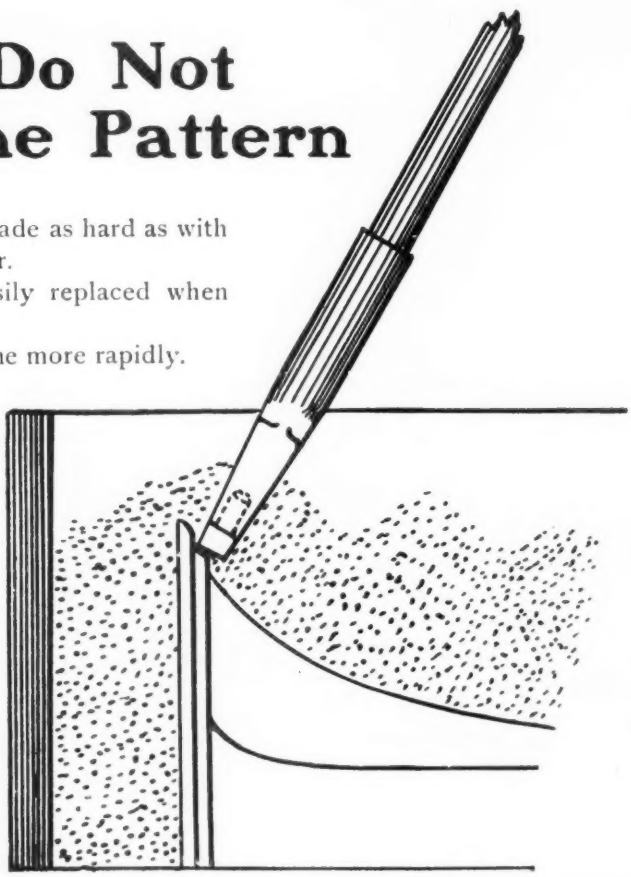
Work can be done more rapidly.

They are for sale by

Hardware and Supply Dealers,

or we are pleased to mail to any address

Special Circular Giving Prices



PNEUMATIC RAMMER

A PERFECT SUCCESS
AS A MACHINE.

A PERFECT SUCCESS
AS A MEANS OF
SAVING TIME, MONEY AND METAL IN THE FOUNDRY.

IN THE FIRST PLACE you can do heavy molding in one quarter the time required for hand ramming, **and one man can work it.**

IN THE SECOND PLACE, the mold will be rammed harder and more uniformly thus preventing "straining" and consequent loss of 10% to 20% of metal.

MADE IN THREE SIZES.

Small size for hand use. Large sizes for suspension from crane.

Easily and quickly put up and moved about over the work.

A great labor saver in **Pipe Foundries.** Special attachments for this work.

When the Casting cools off use our Pneumatic Hammer for Chipping. All sizes.

PHILADELPHIA PNEUMATIC TOOL CO.,

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149 Broadway.	21 So. Twelfth St.	Wood and Water Sts.

TO FOUNDRYMEN:

For more than a quarter of a century the **Cherry Valley** brand of Pig Iron has been at the head of the list of standard, reliable and uniform irons.

The Cherry Valley Furnace

has recently been purchased by us, and we intend to fully sustain the reputation it has earned by faithful attention to material and details.

To those foundries who desire a soft and at the same time strong pig iron, one that is easily machined and gives general satisfaction, we especially recommend our product.

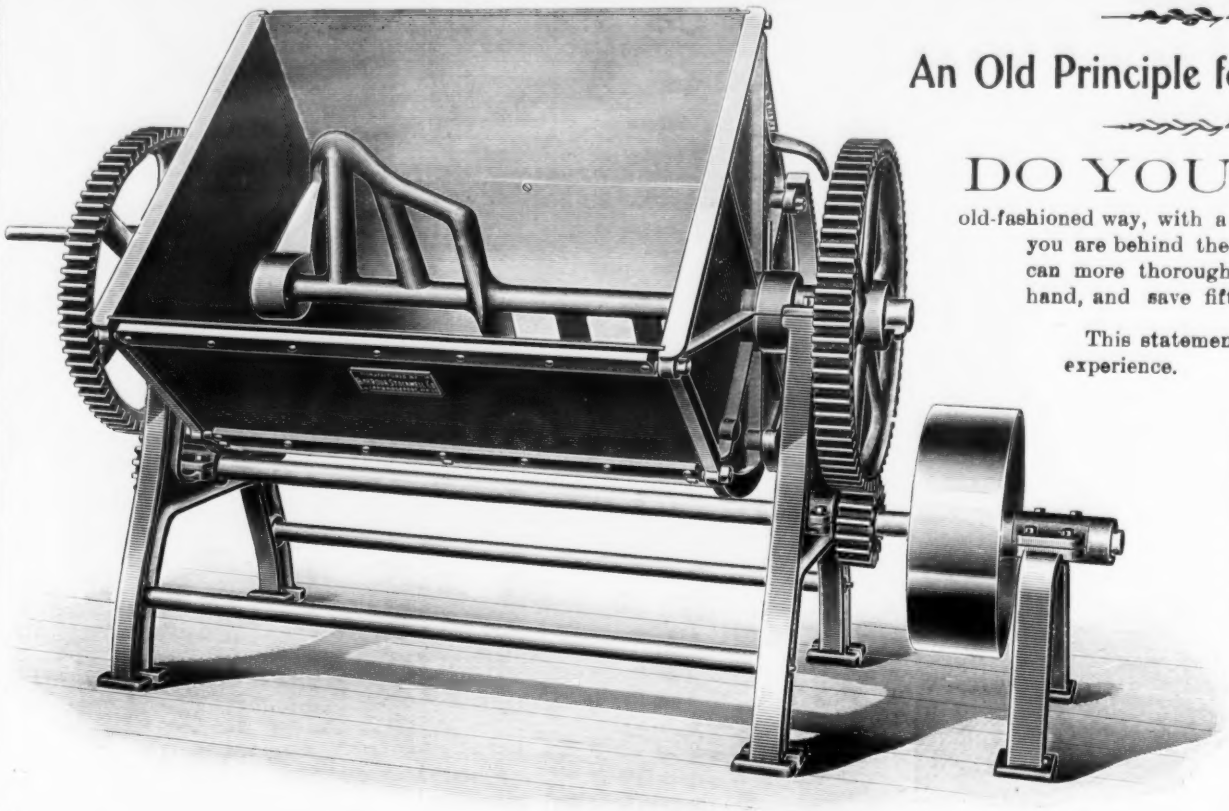
Cherry Valley Iron

is a select iron, made from inspected ores and fuel. It costs but little more than unknown brands. We solicit a trial order.

The Cherry Valley Iron Co.

MURTLAND BUILDING, PITTSBURG, PA.

BOSTON FOUNDRY MIXER.



An Old Principle for a New Purpose.

DO YOU mix your facing sand, core sand, fire clay, etc., in the old-fashioned way, with a laborer and a shovel? Then you are behind the times. With this mixer, you can more thoroughly mix it than is possible by hand, and save fifty per cent. of your labor.

This statement can be verified by actual experience.

The material is shovelled into the machine or fed in through a hopper, after riddling. The machine is then started, and in five minutes the mass is perfectly mixed. Turning a crank at the side cants the machine and empties the material either on the floor or into a receptacle provided.

Capacity, 250 lbs. every five minutes.

Pulley, 24 in. diam. x 6 in. face.

Floor Space, 7 ft. x 3 ft.

Speed of Pulley Shaft, 125 revolutions.

Weight, 1250 lbs.

For further particulars, write

BARBOUR-STOCKWELL CO., 205 BROADWAY, CAMBRIDGEPORT, Mass.

Don't get your back up because you are making money. You can make more by buying our

Specialties

Coreka A liquid core mixture used for dampening core sands for making cores without use of ***Rosin, Flour, Oil or Molasses.***

Standard Core Compound is a dry powder used to mix with core sands which with use of water to dampen same makes good cores without use of any other materials.

New Process Brass Molding Sand contains no vegetable matter. If you make fine Brass, Bronze, Gold, Aluminum, Silver or ornamental castings, and can't get them as perfect as you desire, use New Process Sand.

Standard Brass Facing Coats sand surface for return pattern work without sticking.

Eagle Filler For filling holes in iron and steel castings. It makes surfaces as smooth and hard as perfect castings.

Ajax Steel Core Coating A powder when mixed with Wood Alcohol coats steel cores ready for business.

Radiant Pattern Dressing Used with better success than Shellac or any pattern varnish for dressing and preserving iron and wood patterns. It evens the surfaces and prevents many difficulties in molding.

Plumbago and Silver Lead For all purposes.

Progressive foundrymen are continually on the lookout for anything that will facilitate the work in hand, or reduce cost of production. ***Our Line of Specialties*** are away above and far superior to any other similar line in this country. Full information upon application. :: :: :: :: :: :: ::

The J. D. Smith Foundry Supply Co.,

CINCINNATI, OHIO.

If Quality

IS DESIRED, USE

Our

Crucibles.

McCULLOUGH-DALZELL COMPANY

PITTSBURG, PA.

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CRANES FOR ANY SERVICE.

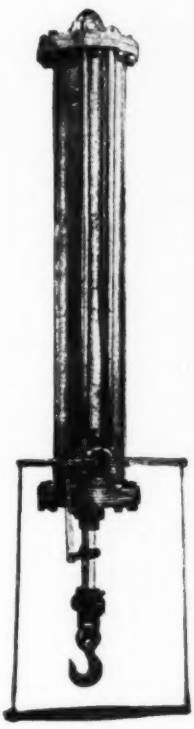
AIR HOISTS Capacities, 300 to 40,000 lbs.

Catalog No. 21 gives full description of Cranes and Air Hoists, sent free if interested.

The Whiting Cupola

600 IN USE BY LEADING FOUNDRIES.

Engineers and Designers



Complete Equipment for Car Wheel and Pipe Foundries, Malleable and Steel Casting Plants.

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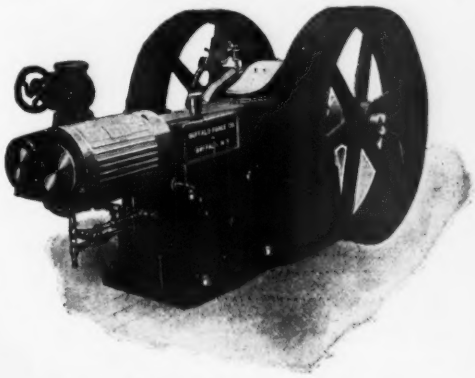
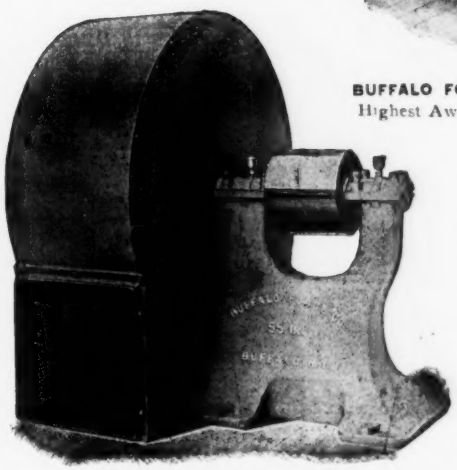
CHICAGO OFFICE: 1543 MARQUETTE BUILDING.



BUFFALO FORGE CO., AUTOMATIC ENGINE.
Highest Award and Gold Medal at Omaha, 1898



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Tumbling Barrel Exhausters are easily applied, thoroughly efficient, and change casting cleaning rooms from a death-dealing pestilence to a comfortable working apartment.

Send for details.

Our 400 Page Calalogues tell all about these machines, applications, etc.; also Fan System of Heating Foundries, etc.

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Buffalo Forge Company,

BUFFALO, N. Y.

BUFFALO CUPOLA BLOWER.

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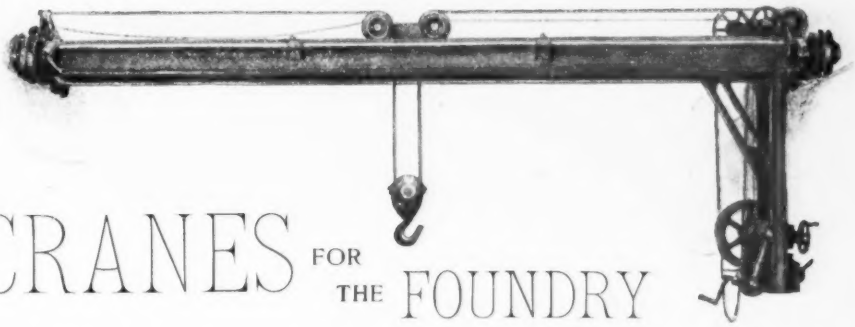

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We are pleased to quote on all classes of Traveling or Jib Cranes for foundry use. The cut shows a special "Pendant Type" operated from the floor —very useful in plants of moderate capacity.

We make Electric, Pneumatic and Hand power designs to suit our customer's conditions. Write us.

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Clinton Iron & Steel Co.

"FAIR DEALING" Their Motto.

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"CLINTON" AND "HECTOR"

INSPECTED FOUNDRY IRONS . . . .

ALSO

Sole Factors for DUNBAR STRONG IRON

In New York and New England.

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NEW YORK OFFICE, No. 15 Cortlandt St.

Why deal with Commission people or Agents who give fancy names to Irons and know nothing about their manufacture

DEAL WITH THE MANUFACTURER DIRECT.

YOUR IRON CONTRACTS

In making your contracts for 1900 for Lake Superior Charcoal Pig Iron, it would do no harm to take up the question of

"PIONEER,"
"ANTRIM,"
"ELK RAPIDS."

These three brands have given satisfaction in car and malleable work for years in the past and will continue to do so for years to come.

Superior Charcoal Iron Co

911, 912, 913 Michigan Trust Bldg.,
GRAND RAPIDS, MICH.

Undisplayed Advertisements.

Rate thirty cents per line each insertion. Answers addressed to our care will be forwarded.

THE EDWARD P. ALLIS COMPANY, of Milwaukee, having recently installed Pulley Molding Machines, offer for sale the following Iron Patterns for Pulleys in first class condition:

IRON PATTERNS FOR LIGHT PULLEYS.

Size in inches.	Price.	Size in inches.	Price.
12x3¼	$3.00	16x4¼	$4.50
12x5¼	4.00	16x4⅜	4.50
12x6¾	5.00	16x4¾	5.00
14x2½	3.00	16x5¾	5.50
14x3½	4.00	16x6	5.50
14x6¾	5.00	18x4⅞	5.00
15x5¼	5.00	18x6	5.50
15x6	5.50	20x5½	5.00
16x3⅞	4.50	20x6	5.50
16x4⅛	4.50	24x5¾	6.00

IRON PATTERNS FOR MEDIUM PULLEYS.

Size in inches.	Price.	Size in inches.	Price.
8x6	$3.00	16x6¼	$4.50
8x8	3.50	16x9	5.50
10x6	3.50	18x6¼	5.00
10x8	4.00	18x8¾	6.50
12x6¼	4.50	20x6½	6.00
12x9	5.00	20x9	7.00
14x6	4.50	24x5¾	6.00
14x9	5.00		

IRON PATTERNS FOR HEAVY PULLEYS.

Size in inches.	Price.	Size in inches.	Price.
8x4½	$3.00	26x8	$7.50
8x6½	3.50	27x6	7.00
8x8¼	4.00	27x9¼	8.50
9x6	4.00	28x7	7.50
9x7¾	4.50	28x9½	9.00
10x3½	3.00	29x7⅛	8.00
11x6	4.50	29x9½	9.00
11x8	5.00	30x7	8.00
12x5¼	4.50	30x9¼	9.00
12x6	4.50	32x11	11.00
12x7	5.00	32x15½	13.00
12x8	5.00	34x9⅞	11.00
12x9	5.50	34x15	18.00
13x7	5.00	36x8½	12.00
14x5¼	5.00	36x12	17.00
14x8⅝	6.00	36x16	21.00
15x7¼	5.00	36x20	26.00
16x6	5.00	36x25	30.00
16x8	6.00	38x11	18.00
17x7¼	5.50	38x15½	24.00
18x5	5.00	40x9⅜	18.00
18x6	6.00	40x15	25.00
18x9	7.00	42x20	35.00
18x12	8.00	44x15	30.00
19x7	7.00	48x9½	25.00
20x6½	7.00	48x15	35.00
20x8	8.00	48x18	40.00
20x9¼	8.50	48x21¾	45.00
20x12¼	9.00	48x25½	48.00
21x7¾	7.50	54x22	55.00
22x6½	7.00	54x25	60.00
22x9¼	8.50	58x9½	38.00
23x6⅞	7.00	58x14	50.00
24x6	6.50	58x18	68.00
24x7¼	7.50	58x21½	75.00
24x9	8.00	58x25½	80.00
24x12½	9.00	60x17½	65.00
25x7½	7.50	60x22	80.00
25x9½	8.00	60x25½	90.00
26x7	7.50		

	Weight.	Price, each
1 Iron Flask for 60 inch Pulley	3,500	$61.25
2 " " 58 " "	3,500	61.25
2 " " 54 and 56 in. Pulley	3,000	52.50

FOR SALE—One 3 to 4 ton jib chane, hand power. Blue print and price on application. James Leffel & Co., Springfield, Ohio.

WANTED—Second-hand five ton geared Crane Ladle. Give dimensions, condition and price. Benj. Eastwood Co., Paterson, N. J.

WANTED — Immediately; first-class brass molder; one competent to mix and melt his own compositions. Apply to The Jenckes Machine Co., Sherbrooke, Quebec.

WANTED—Position in foundry located in country village by an all around molder. Would prefer Eastern States. Address "Country Foundry," Box 424, care THE FOUNDRY.

FOR SALE.—Stove patterns and follow boards. Have been used. Owner has no use for them. Will sell or trade. Make your own price. Address "Patterns," Box 422, care THE FOUNDRY.

FOR SALE—One Colliau Cupola, 40 in. diameter inside shell. Capacity about three tons per hour, with stack, 24 ft. high above base plate. Good condition. Benj. Eastwood Co., Paterson, N. J.

PARTNER WANTED—Machine works and foundry established twenty years, is open for a partner who has a knowledge of the business and can bring work. Address "Foundry," Box 417, care THE FOUNDRY.

WANTED—Foreman for light jobbing foundry. One competent to take full charge of the same. If satisfactory can arrange for a part interest. Give references and salary expected. Address "Partner," Box 420, care THE FOUNDRY.

FOR SALE—One water cinder mill, 33 in. diameter, 48 in. long; complete with pulley and standards. It will separate and save all iron from the cinder in cupola drop and deliver it bright and clean. Fowler Radiator and Manufacturing Company, Johnstown, Pa.

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FOUNDRY FOREMAN WANTED—Thoroughly competent molder who has had experience as foundry foreman, to take charge of foundry department employing about 60 molders and helpers. Address, with references, "Foundry Foreman," Box 414, care THE FOUNDRY.

WANTED—Foreman for pattern shop employing from fifteen to twenty men. Must be thoroughly versed in wood and all forms of metal man preferred. Brains and energy will insure promotion and good salary. Address "Stove Foundry," Box 423, care THE FOUNDRY.

FOR SALE—A modern equipped machine shop and foundry, employing 25 hands, and doing a good business, in a thriving city of 40,000 inhabitants. A prominent R. R. center in Southern New York. Reasons for selling, ill health of proprietor. Address "M. E.," Box 415, care THE FOUNDRY.

FOUNDRY FOREMAN—Best references and ability, wishes position. Large experience in gas engine, ice machinery and marine works. Strictly up to date. Good results in mixing, melting, management of men; heavy or light work; loam, dry sand, green sand. Temperate and reliable. Address "Foreman," Box 411, care THE FOUNDRY.

OLIVER WOOD TRIMMERS SAVE MONEY ON PATTERNS

DO YOU think we'd tell you that "Oliver Wood Trimmers save money on patterns" if it wasn't so? Goodness, No! Our business is built on a firm foundation. Every year sees an increase. Our new factory, with its additional space and equipment, is running twenty-three hours a day. Still behind on orders. The satisfactory fulfillment of claims makes this success. In construction, carefully designed and accurately made jigs and fixtures as universally used. This eliminates questionable hand work. The most comprehensive guarantee ever made accompanies every machine sold. We don't rest on laurels gained, but progress.

Our No. 6 Oliver Wood Trimmer, shown here, has valuable points never seen on a trimmer before. Let us tell you all about it and explain that guarantee.

AMERICAN MACHINERY CO. GRAND RAPIDS, MICH.

No. 7½ GRINDER.

This Grinder

was designed by us for foundry use. One stove maker has 16 of them. The distance between wheels is 48 inches, diameter of spindle between flanges 1¾ inches or 2 inches, as ordered Babbitted boxes with three ring oilers. Weight, 1200 lbs. If you want a good substantial grinder write us for circulars and prices.

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FOR SALE.—Three thousand pound Otis elevator. Fine condition. $150.00. Also two large emery wheel stands. Swing 24 inch wheels. $25.00 and $35.00. Gibson Iron Works, Jersey City, N. J.

WANTED.—A competent foreman for foundry making Corliss engines and refrigerating machinery. A good place for an ambitious and intelligent man. Address "Corliss," Box 426, care THE FOUNDRY.

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No. 1 Root, improved style, excellent order, $110.
No. 2 Root, improved style, excellent order, $165.
No. 4 ½ Baker, perfect order, little used, $250.
No. 7 Root, improved style, little used, $650.
Blowers bought, sold, exchanged and repaired.
A. ASHER, 109 Liberty St., New York.

WANTED—At once, by Easton Stove Foundry, competent man as superintendent. Must be familiar with construction from pattern work and foundry practice to mounting. Young pattern work, and be able to read blue-prints. First-class wages to a first-class man. Address "Pattern Foreman," Box 410, care THE FOUNDRY.

FOR LEASE—Our foundry, located in one of the largest and most progressive cities in N. C. Capacity 8 to 10 molders, which can be increased if desired. We have been making our own castings, but prefer to lease our foundry and buy our castings. A good opportunity for a live man. Address Salem Iron Works, Winston-Salem, N. C.

WANTED—A man with ten to twenty-five thousand dollars to invest in a prosperous manufacturing enterprise in Texas, and capable of taking the superintendency of the mechanical end of the business. Machine shop and foundry now employing one hundred men. For further particulars address Chas. H. Besley, South Canal Street, Chicago, Illinois.

WANTED—A man with experience and capable of handling men to take charge of the brass foundry, running about five molders, of a manufacturing concern in Chicago. Must understand the mixing of metals and must work at the tub. State age and experience. Permanent position to the right party. Address "Brass Foundry Foreman," Box 412, care THE FOUNDRY.

FOR SALE—A foundry plant in complete operation employing 40 molders and doing a large and profitable business making a line of staple specialties, sales of which can be increased to almost any extent. The plant is situated in an inland city in a Central Western state, and railroad facilities are exceptionally good. The owner wishes to retire. This is a splendid opportunity for a good practical foundry man with some capital; or a partnership could be formed with the practical men now in charge of the different departments. Address "Interest," Box 419, care THE FOUNDRY.

FOREMAN WANTED—Shop employing 50 to 75 floor and bench molders, making great variety of large and small gray iron castings. Must understand thoroughly handling of men and improved tools and methods. Wanted Sept. 1st. Write, giving age and experience. A permanent place, with good salary, to the right man. Address "Competent Foreman," Box 416, THE FOUNDRY.

TRAVELING SALESMAN WANTED—I want a competent man who is thoroughly familiar with the malleable implement and bicycle business; a man who has a fair knowledge of molding, patternmaking, and also possesses an acquaintance with the manufacture of gray iron castings. I want an industrious man of good habits and address, who can visit manufacturing concerns, look over their requirements and be competent to make them a price on both gray iron and malleable iron castings. To the right party this is an opportunity but seldom presented. For further particulars address Henry Wilson, Box 425, care THE FOUNDRY.

The way to get rid of things you have no further use for around your shop is to advertise them in The Foundry.

This is the way to turn into money that which is only taking up room.

When you want to buy anything in the second hand line The Foundry again will put you in communication with the right people.

The cost of buying or selling through The Foundry is cheap. Thirty cents a line.

"ANALYSES OF PIG IRON"

OF THE UNITED STATES AND GREAT BRITAIN.

Published in Book Form and ready for delivery about July 1st, 1900. Price, $2.50 per copy, (postage paid) Price, to foreign countries, (postage paid), 12 Shillings.

Those wishing a copy of this publication should send their names and addresses, as only a limited number of copies will be issued.

We are desirous of publishing also in this book the analyses of pig iron made in Canada, Mexico and the Continent of Europe, and we will be obliged to any furnaces which will send us analyses of their pig irons, so that they will be represented in this publication.

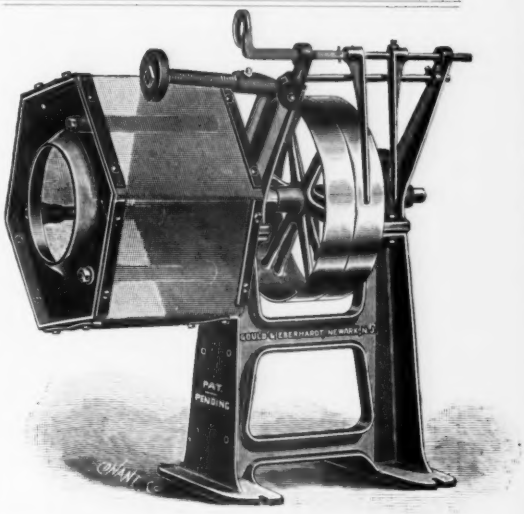
S. R. CHURCH, Publisher,

307 SANSOME STREET, SAN FRANCISCO, CALIFORNIA.

The Editor of this Journal has offered us **Big Money** to allow him to describe in this paper some of our special machines, such as segment face-plates, gear cutters, flexible shaft hand tools, etc. We said "Nay, nay, Pauline." :: :: ::

The
Gobeille Pattern Co.
Cleveland, Ohio.

Largest Shops and Finest Equipment in the world.



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GENTLEMEN—As to the working of the Sand Sifter, it is *more than satisfactory*. After using a shaker, which not only shook the sand, but also shook itself apart periodically, it is a great relief, doing its work *quietly* and *thoroughly*, and we shall be pleased to recommend it to anyone you may refer to us. Yours truly,

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John Lang & Sons, Johnstone, Scotland; and England.
Selig, Sonnenthal & Co., London, England.

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T. Carr, (English Fire Tiles).

S. R. CHURCH,

307 Sansome Street. San Francisco.

"ANALYSES OF PIG IRON."

COLLECTED AND PUBLISHED BY

S. R. CHURCH

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HOLMES, STRACHAN & CO.,

Manufacturers and Shippers of

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Brands: Steel Savage Mountain Holmes.

Best for Malleable Furnace and Cupo a Work.

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FIRE BRICK of All Shapes and Sizes.

Cupola Linings Etc.

420 E. 23rd Street, NEW YORK.

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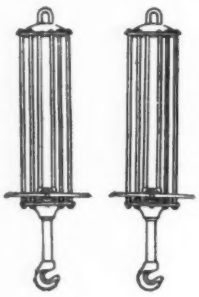

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WOODBRIDGE, N. J.

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High grade FIRE BRICK.

Best for Rolling Mills, Blast Furnaces, Foundries, etc. "Try our Cupola Blocks and Scioto Ground Clay."

The Scioto STAR Fire Brick Works,

PORTSMOUTH, OHIO.

Send for Catalogue.

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Incorporated 1876.

Telephone, Canal 267.

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All Grades and Shapes of Fire Brick and Cupola Block.

H. S. VROOMAN,

220 West Twentieth Street,

CHICAGO.

"The Cupola Furnace"

will tell you how to melt iron rapidly and economically. It will show you how to keep your cupola in perfect working order. :: :: :: ::

Three Dollars and a Half Pays for it.

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DETROIT, MICH., U. S. A.

Heyl & Patterson

ENGINEERS AND CONTRACTORS,

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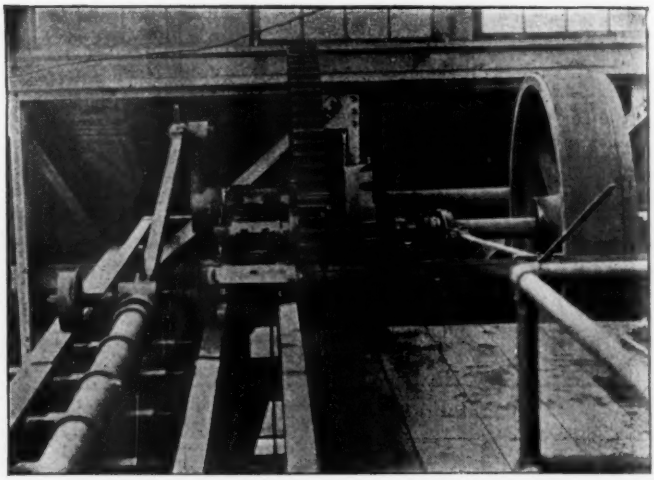
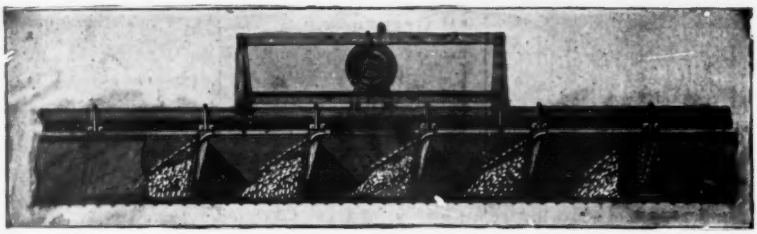
ELEVATING AND CONVEYING MACHINERY.

RECIPROCATING CONVEYORS FOR TRANSPORTING SAND.

FEEDING AND MEASURING DEVICES FOR THE AUTOMATIC TEMPERING OF SAND.

SLOW SPEED, PERFECT DISCHARGE ELEVATORS.





Views of 230-foot Reciprocating Sand Conveyer at Westinghouse Air Brake Co.'s Foundry, . . Wilmerding, Pa.

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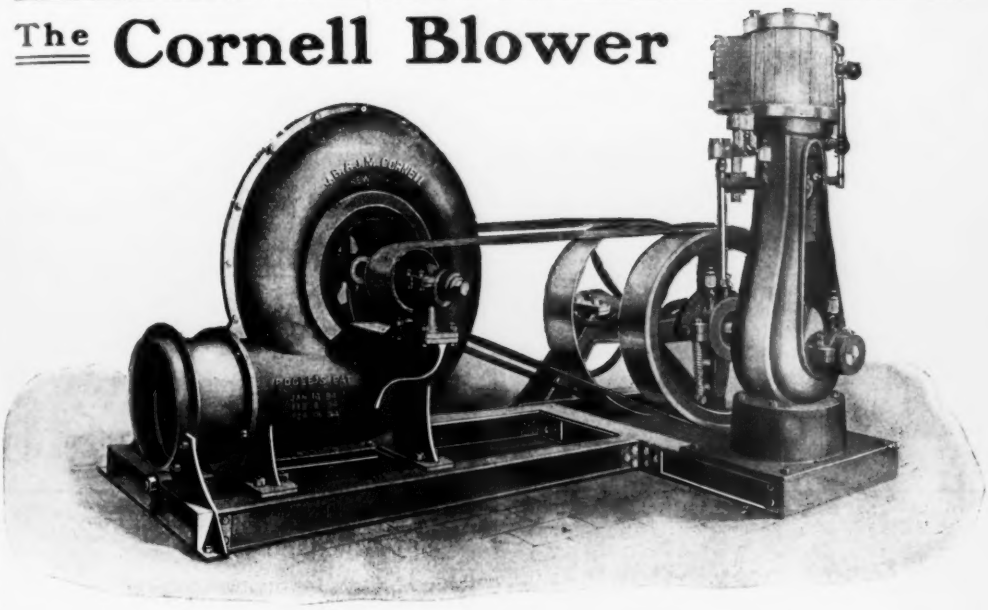
THE AJAX METAL COMPANY, PHILADELPHIA, PA.

The Cornell Blower



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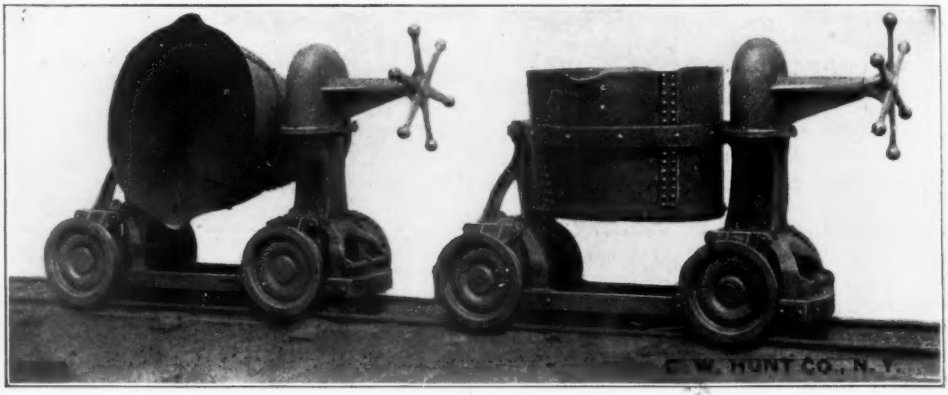

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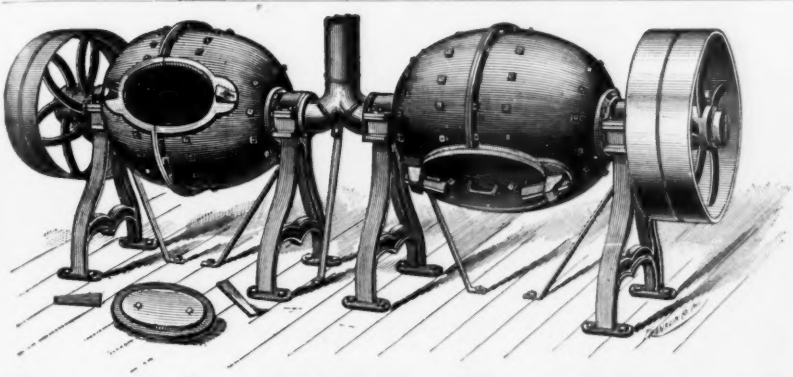

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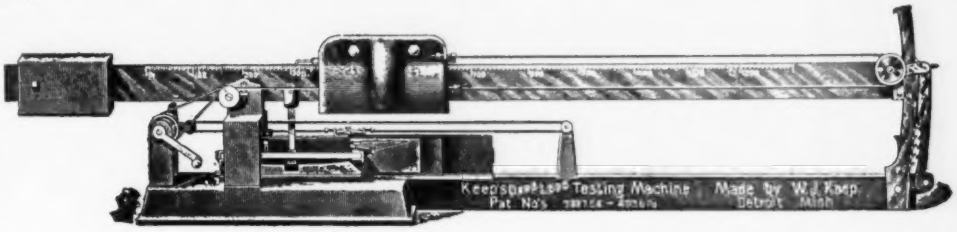

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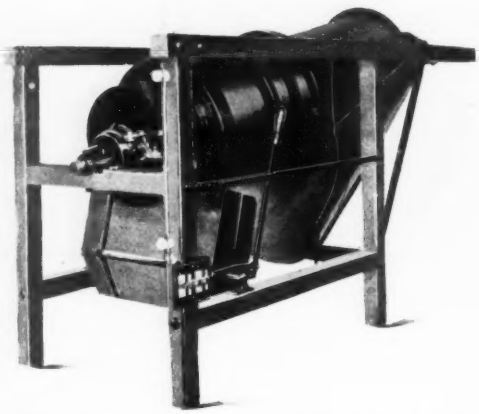

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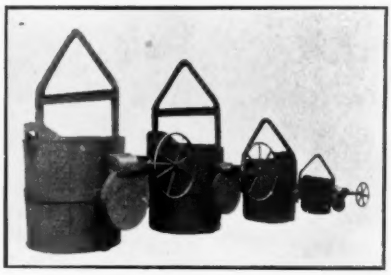

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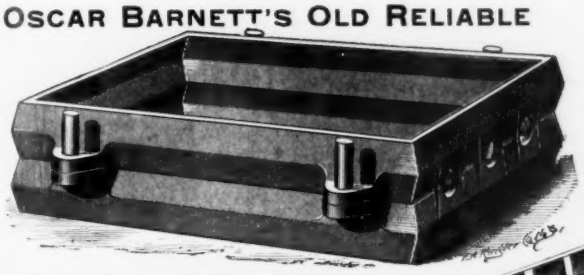

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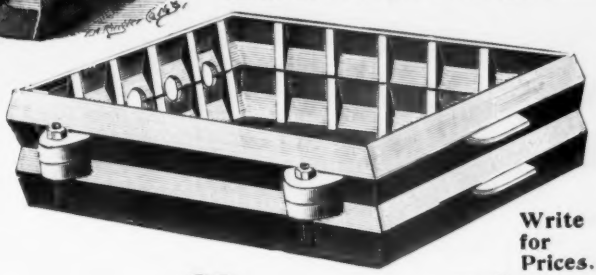

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Pig Iron and Coke

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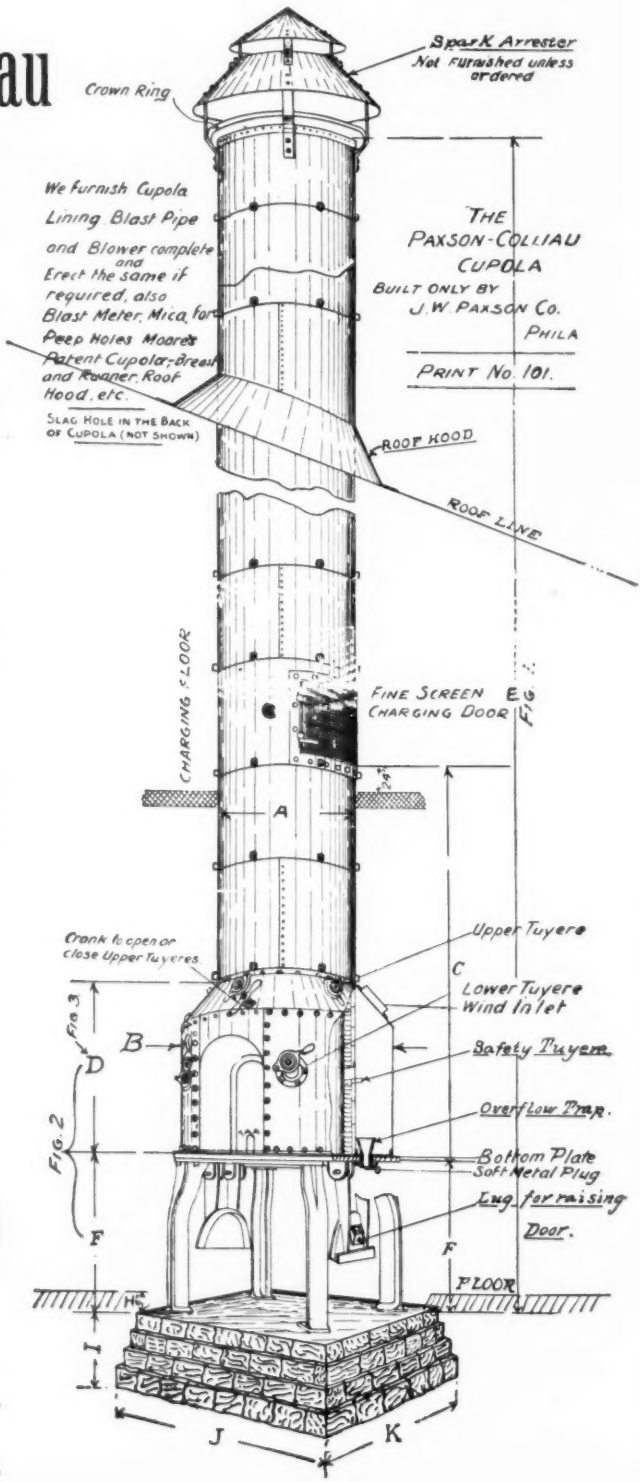

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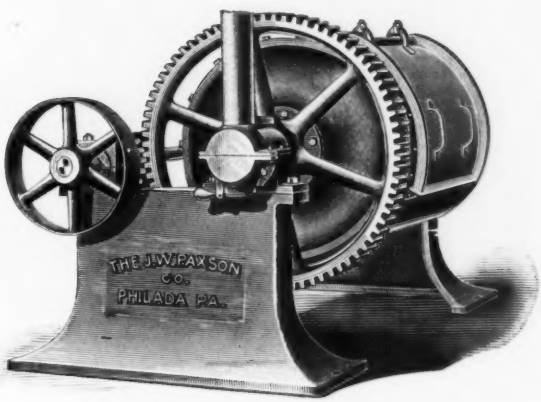

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40	"	"	"	"		36	"	60 "

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One Solid Sheet of Steel.

Wide Door Extends Full Length of Mill.
Ribs on Inside to Keep Castings from Slipping.

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OF ALL KINDS.
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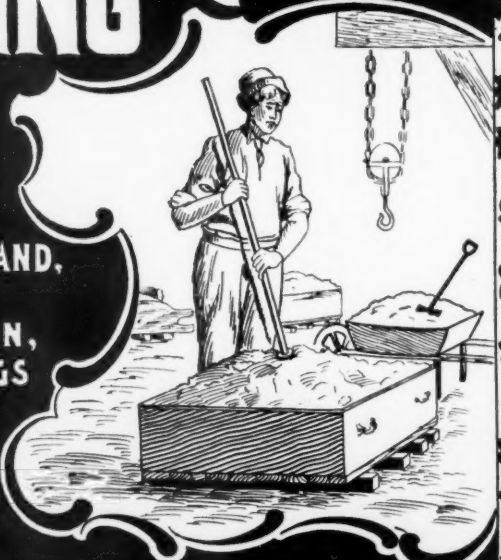

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VERY MUCH ALIVE!

At the meeting of the American Foundymen's Association, June, 1900, one of the delegates said:

"Plumbago blacking, it seems, is only a memory. Molders hardly ever see or handle any now-a-days. Substitutes have largely taken its place, for, like any other article that is dear, a substitute is sure to be provided. The blackings of the present day are composed, to a great extent, of common cement, pulverized anthracite, charcoal, soapstone and other cheap minerals, and it is a question if they do not cost more than they are intrinsically worth. Some of them peel very well indeed, but the great majority of cheap blackings do not peel well and are difficult to work on a mold. It would be worth while for some one statistically inclined to figure out how much longer it took a molder to properly slick up a mold—if such a thing is poss ble—with a poor blacking than if he had a good quality and see if the difference in time, not to speak of results, would not buy a good article. Castings are certainly much harder to clean with poor blacking. If the sand fuses—as it is sure to do on heavy work—a very bad job is the result, and, in addition to the molder's extra time on the mold, it costs more to clean the casting, and then the results are not fully satisfactory to anybody concerned, oftentimes resulting in the loss of a valuable customer. Every foundryman should strive for that which will give his shop the name of turning out the best and nicest castings in his vicinity. 'Tis the kind of policy that easi'y pays, particularly shops that handle machinery castings."

As a matter of fact, the Dixon Company have of late had a steadily growing trade for its India Silver Lead facings. Molders have, without doubt, found out that it does not pay to use cheap mineral facings. Molders have learned that cheap mineral facings do cost a great deal more than they are intrinsically worth.

The Dixon Company manufacture a large variety of plumbago facings which very successfully meet all varieties of work, and the prices are low, quality considered. It will easily pay any founder to carefully investigate the subject.

Samples and prices on request.

Joseph Dixon Crucible Company,

JERSEY CITY, N. J.

C. F. M. FOUNDERS' PERFECT WASH

A FEW MORE

FOUNDRY SUPPLIES

CORONA PLUMBAGO

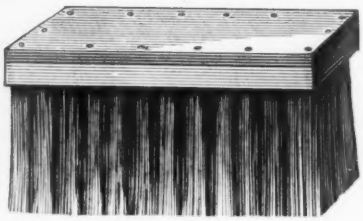

Fig. 17 in Catalogue.

Steel Wire Casting Brushes

ALL SIZES AT RIGHT PRICES.

The Cleveland Facing Mill Co.

FRANK H. CHAMBERLIN, Prop.

MANUFACTURE FOUNDRY { FACINGS SUPPLIES

CLEVELAND, O.

Molders' Soft Brushes

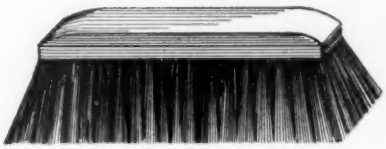

Fig. 28 in Catalogue.

BLOCK 10X2 IN. BRISTLES 3 IN. LONG.

PERFECTION CORE BOXES

SEND FOR CATALOGUE

CUPOLA BLOCKS

A NEW CORE FLOUR

"COREINE"

It has been tried by many of the largest foundries and has been found far better than anything ever used. Its main qualities are:—

FIRST. It makes a very smooth and uniform surface and hard core.

SECOND. It does not crack or expand and takes less time to bake.

THIRD. It is not necessary to use as much of "Coreine" as of the low grade flour, and the former costs less per ton.

It is used the same as low grade flour. Write for prices.

THE FOREST CITY MILLS CO.

CLEVELAND. OHIO.

AMERICAN BRIDGE COMPANY

DESIGNERS AND BUILDERS OF

Steel Bridges

Steel Buildings

AND ALL CLASSES OF

METALLIC STRUCTURES

GENERAL OFFICES:

No. 100 BROADWAY, NEW YORK CITY

BRANCH OFFICES:

BOSTON
PITTSBURG
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PHILADELPHIA
BALTIMORE
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CHICAGO
NEW ORLEANS

M. M. COCHRAN, PRES.
W. HARRY BROWN, V-PRES.

JNO H. WURTZ, SECY.-TREAS.
J. S. NEWMYER, MANAGER.

WASHINGTON COAL & COKE CO.

CAPITAL, PAID UP, $500,000.

3500 Acres of Coal. **5000 Tons Daily Capacity.**

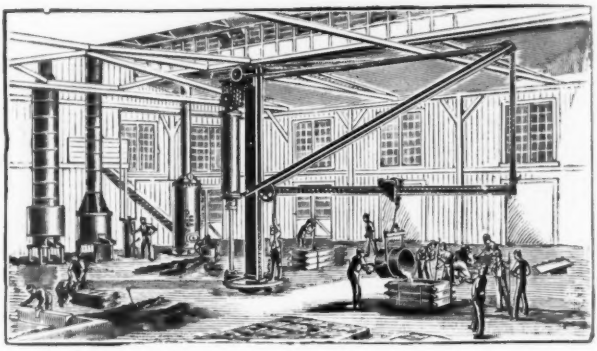
350 COAL AND COKE CARS — 500 COKE OVENS.

Foundry Coke Our Specialty.

GENERAL OFFICE—
DAWSON, FAYETTE CO., PA.

SALES OFFICE—PITTSBURG, PA.
N. P. HYNDMAN, SALES AGENT.

You Don't Care, Do You?



5-Ton Steam Hydraulic Crane in a foundry.

You go to the mountains or or seashore.

Let 'em sweat! They are only workingmen, while you are of the blood royal for some reason or other. Perhaps because you had a good smart forbear who laid a foundation for you.

But all men are not alike. Some bosses have found out it pays big, very big, to make things as easy for the men as possible, hence the nice wash rooms and all kinds of conveniences.

Some bosses find it pays to take the hard, slow lifting off the men and let the boiler do the lifting quickly.

We make the Ridgway Balanced Steam Hydraulic Crane, which hitches the boiler right to the work and saves the men dead loads of hard work.

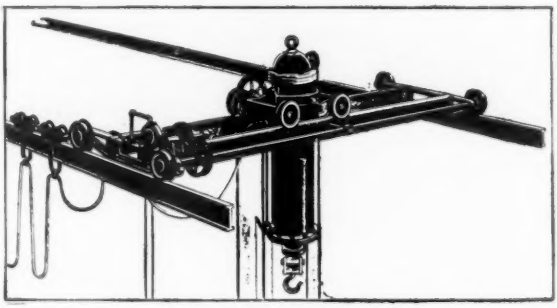
But let 'em sweat! What do you care for dog days? You go away and have a good time. Little you care for your men—and little they care for you, perhaps.

Good bosses are interested in Ridgway Cranes or anything else that will save the men. Ridgway Cranes let old Mr. Steam have a chance to do all the hard bone labor. It don't hurt to let old man Steam sweat. That's his manner of life, and when he sweats something is getting done.

Yes, we know you "Don't Care a Continental," but you ought to care a little for your men—your men all live along the road to your pocketbook. Let 'em sweat.

HYDRAULIC AIR HOISTS.

Our oil-governed air hoists are the only kind that wise men are getting. We are constantly replacing other sorts. We could say a great deal more than we do say. About all we are doing nowadays is to keep you reminded that if you want the cheap hoists you don't want the oil-governed sort, as they are quite costly to make, but they really are the cheapest.



"PLEASE TAKE THE ELEVATOR"

YOU CERTAINLY WILL IF YOU KNOW IT.

CRAIG RIDGWAY & SON CO., COATESVILLE, PA.

EUROPEAN AGENT,

CHAS. G. ECKSTEIN, 16 Spandauerstr., Berlin, Germany.

William Sellers & Co. Incorp.

PHILADELPHIA, PA.

Foundry Machinery.

Every Foundryman knows to his cost that machinery exposed to the dust, dirt and heat of a foundry, is subjected to very severe conditions of service, and unless it is properly designed "to stand the racket" will rapidly wear out.

Having operated Foundries in connection with our Machine Tool Works for half a century, we have had abundant opportunity to study this question in all its phases, both from the theoretical standpoint of the designer of such machinery, and from the practical standpoint of the user.

All of the labor saving appliances intended for use in Foundries, which we advertise in "THE FOUNDRY," and elsewhere, were designed primarily for our own use, and their good qualities were thoroughly tested by us in our own Foundries before offering them to the public.

We make **Foundry Jib Cranes** of iron frame work instead of wood, and without struts, thus being entirely clear of obstructions underneath. They are operated by electricity, steam, or other power, and have rapid motion in hoisting the load and in swinging.

We make **Traveling Cranes** which will lift the copes of the longest molds **absolutely vertically** and without jarring the sand. We make Cranes that lift the largest castings and transport them to any portion of the floor very expeditiously. The most perfect safety devices have been invented and applied to these Cranes, so that the load can never lower except at the will of the operator. All parts of the machinery are conveniently located for oiling, and for making necessary renewals or repairs.

Last, but not least, we make a **Centrifugal Sand Mixing Machine** which has literally worked a revolution in the method of preparing facing sand, molding sand and core sand in foundries wherever it has been introduced. "THE FOUNDRY" for April contains a list of a few of the recent purchasers of this remarkable labor saver in mixing sand, as well as improver of molding sand.

To those who are sufficiently interested in what we have here said to wish to know more, we will be pleased to send on application, illustrated booklets describing our jib and traveling Cranes and Centrifugal Sand Mixing Machine.

Over 15,000 in Use.

ALWAYS READY!

800 TO 2,000 CANDLE POWER.

ESPECIALLY ADAPTED FOR

FOUNDRIES

PORTABLE, SELF-CONTAINED AUTOMATIC.

NO SMOKE! NO SPRAY! NO SHARP SHADOWS!

Now in Valuable Use With Hundreds of Foundries,

In addition to 400 Railroads and over 500 Contractors.

ROSS-MEEHAN FOUNDRY CO.
CHATTANOOGA, TENN., May 5, 1896.

The Wells Light M'f'g. Co., Nos. 44 and 46 Washington St., New York City:

GENTLEMEN—It is contrary to our rule to give testimonials, but an article with the merit of your Wells Light deserves to be made an exception. We have used your lights for the past five years, and consider them indispensable to us.

Yours very truly,
ROSS-MEEHAN FOUNDRY CO.
P. A. BRAWNER, JR., Sec'y. & Treas.

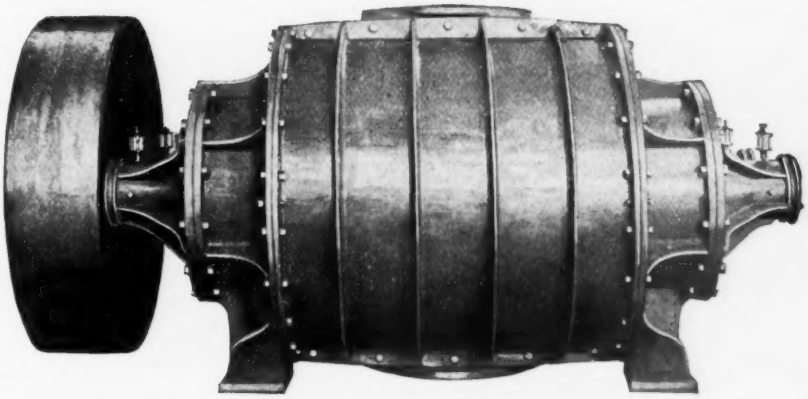
REQUEST CIRCULARS FROM

THE WELLS LIGHT M'F'G. CO.,

EDWARD ROBINSON, Sole Proprietor.

44-46 WASHINGTON STREET, NEW YORK.

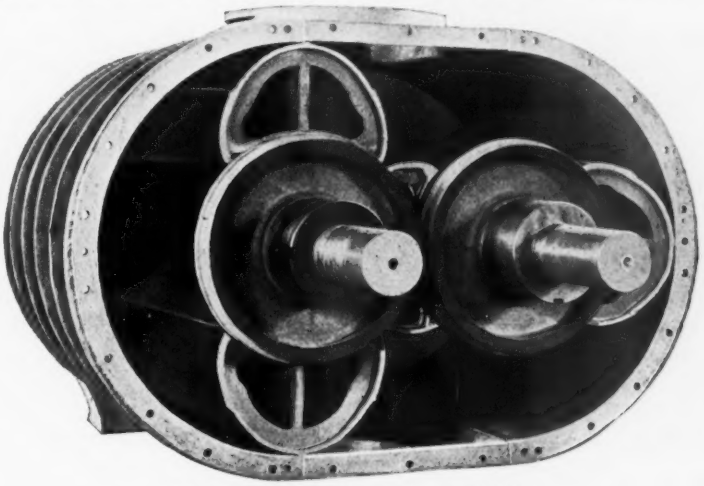
THE GREEN Rotary Pressure Blower



NEW CENTURY PATTERN.

YOU WILL SEE That the working parts are two perfectly balanced impellers mounted on forged steel shafts. They run in bronze bushings, detachable journal bearings and the cut gearing at both ends of the blower is enclosed in oil tight casings.

The Green Blower occupies less space and weighs less than any other Positive Blower in existence.



NEW CENTURY PATTERN—INTERIOR.

Foundry Blowers, High Pressure Blowers, Gas Exhausters, Exhausters for Hot Gases.

THE GREEN GIVES THE MOST VALUE FOR A $.

SEND FOR NEW CATALOGUE B.

Wilbraham Baker Blower Co.,

PHILADELPHIA, PA.

Sales Agents: FRAZER & CHALMERS, Inc., Chicago, Ill. and Branch Houses.

44-46 WASHINGTON STREET, NEW YORK.

ROSS-MEEHAN FOUNDRY CO.
P. A. BRAWNER, JR., Sec'y. & Treas.

Smooth-On Cements

In up-to-date foundry practice, the time has come when the intelligent use of an iron cement that will withstand fire, water and steam and stay where it is put, has become a shop necessity. A blemish on an iron casting may not injure it, but like a wart on a nose it looks ugly and should be removed. Just here is where Smooth-On Castings is valuable to the manufacturer in saving good castings and to the consumer in avoiding delays in procuring them.

Don't use an inferior filling because it is cheap, to do so is neither wise nor economical. Use only the best. Then with an expert, whose good judgment in the use and skill in the application, Smooth-On Castings saves time and money. Smooth-On Castings is useful for many other purposes, daily new uses are being discovered for it.

We make a Smooth-On Compound for Engineers and Steamfitters use, for making connections to withstand high temperatures and high pressures. Unequaled for making Flanged Joints and Boiler Patching.

We also make a special cement for connecting coils, for ammonia machines, for refrigeration. Write for Catalogues and Prices.

SMOOTH-ON MFG. CO.,

VREELAND TOMPKINS, CHEMIST AND MANAGER.

547-549 COMMUNIPAW AVENUE. JERSEY CITY, N. J., U. S. A.

JOHN G. O'NEIL, MANAGER CHICAGO OFFICE, 335 THE ROOKERY.

YOU

CANNOT AFFORD TO BE WITHOUT ONE OF THE ONLY

Electromagnetic Separators.....

ON THE MARKET THAT DOES NOT WEAKEN WITH USE

IF YOU ARE INTERESTED, SEND FOR A FULL DESCRIPTION OF THIS MONEY-MAKER.

IT IS YOURS FOR THE ASKING.

IF YOU HAVE AN UP-TO-DATE FOUNDRY, YOU SHOULD HAVE OUR 1900 CATALOG FOR REFERENCE.

WE MAKE FOUNDRY SUPPLIES GALORE.

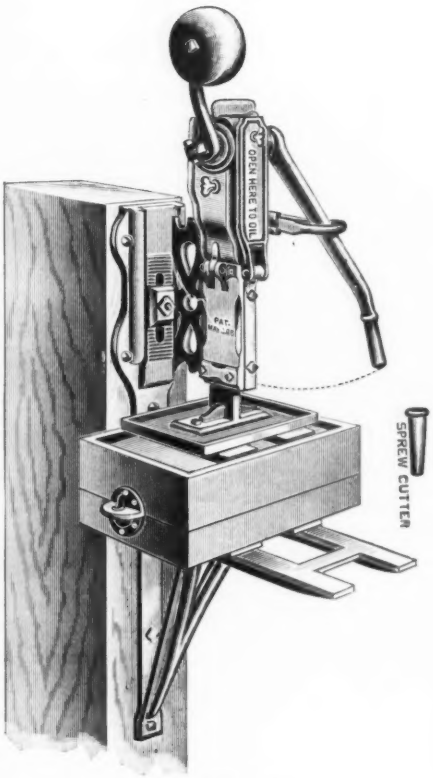
Brass Founders Supply Co.

NEWARK, N. J., U. S. A.

W. B. BURNS'

Economic Molding Machine

SYRACUSE, N. Y.



The

QUICKEST Adjusted

EASIEST WORKED

and

Most POWERFUL

Machine on the market,

Giving a POSITIVE

UNIFORM Pressure.

No DUST can get to WORKING parts

WHICH ARE ALL ABOVE THE SAND PILE.

MANUFACTURED BY

Syracuse Malleable Iron Works,

SYRACUSE, N. Y.

CORRESPONDENCE SOLICITED.

ROOTS'
BLOWERS

There are Brier ROOTS
Cube ROOTS
Square ROOTS
BUT ONLY ONE

P. H. & F. M. ROOTS

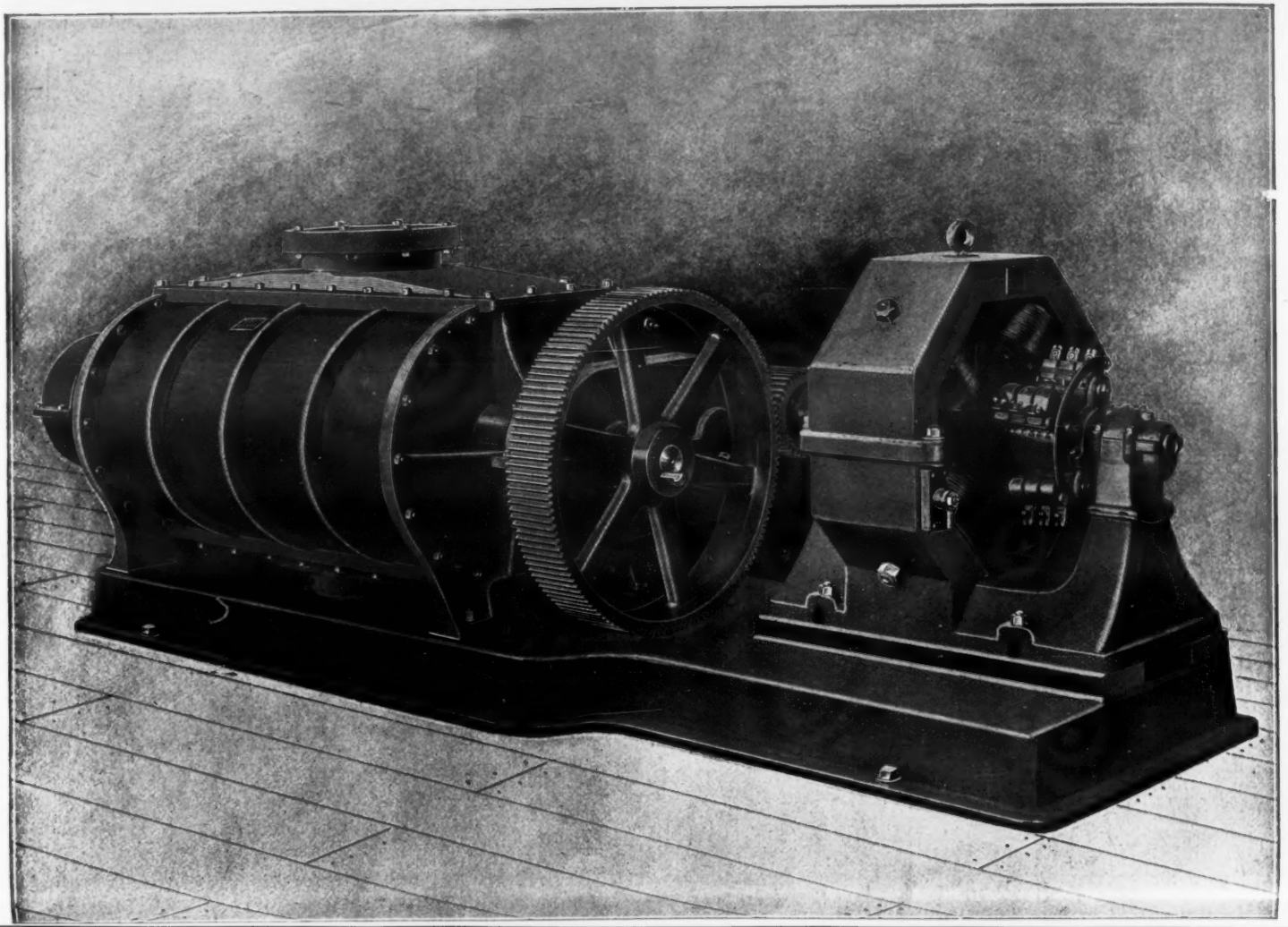
ALWAYS THE STANDARD.
OTHERS IMITATE, BUT NEVER EQUAL.

Forty years' experience boiled down to the most modern *Pressure Blower* in design and workmanship.

THE ROOTS obtains the *minimum of friction* and the *maximum of efficiency*. Others do not—cannot.

P. H. & F. M. ROOTS CO.,
109 LIBERTY ST., NEW YORK. CONNERSVILLE, IND.

CHICAGO OFFICE:—1538 MARQUETTE BUILDING.



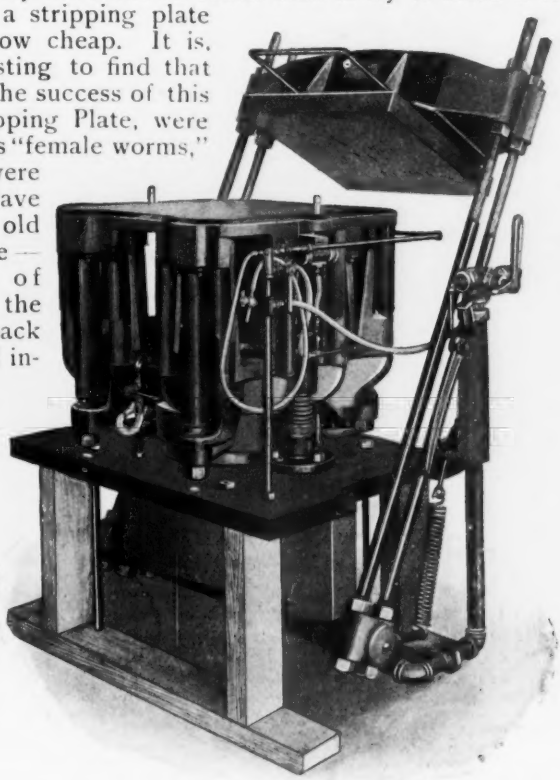
A Bit of Molding Machine History.

The first U. S. Patent for any kind of a Molding Machine was issued early in 1852 to a man named Satterlee, and it was quite a machine—seems to have been in appearance about half way between an eight day clock and a cider press—had "wheels"—of odd kinds, gear, sheave and sprocket, had pitman, levers, pawls, counterweights, chains and toggles—more gear than Kipling put into McAndrews Hymn.

All this mechanical uneasiness was to accomplish what the inventor called "the said work of sifting, filling and pressing."

Thus he omitted from the functions of a machine like a perfecting press and costing almost as much, the drawing of the patterns, the ONLY thing that some foundrymen are today buying $50 machines to do, on each of which they spend upwards of $1,000 for stripping plates and patterns. Satterlee was evidently ahead of his age in the U. S., for in England the very first idea of a molding machine, patented by one Maullin in 1800, was in effect nothing but a Stripping Plate—like some of our machines today—the $50 for machine, $1,000 for patterns kind. Maullin's machine molded screws (gimlet pointed too!), but even he in 1800 would probably have known better than to try to mold a lock case or a flat bevel gear with a stripping plate rig, no matter how cheap. It is, moreover, interesting to find that contributing to the success of this George 3rd Stripping Plate, were what Maullin calls "female worms," which, if they were not nuts, must have been limbs of the old temper of Eve—which would of course carry the Stripping Plate back before Noah, and indicate that some of its family came through in the Ark.

The Stripping Plate still has its uses—in bad company—and we still use it when it is insisted upon, but only four times since 1895.

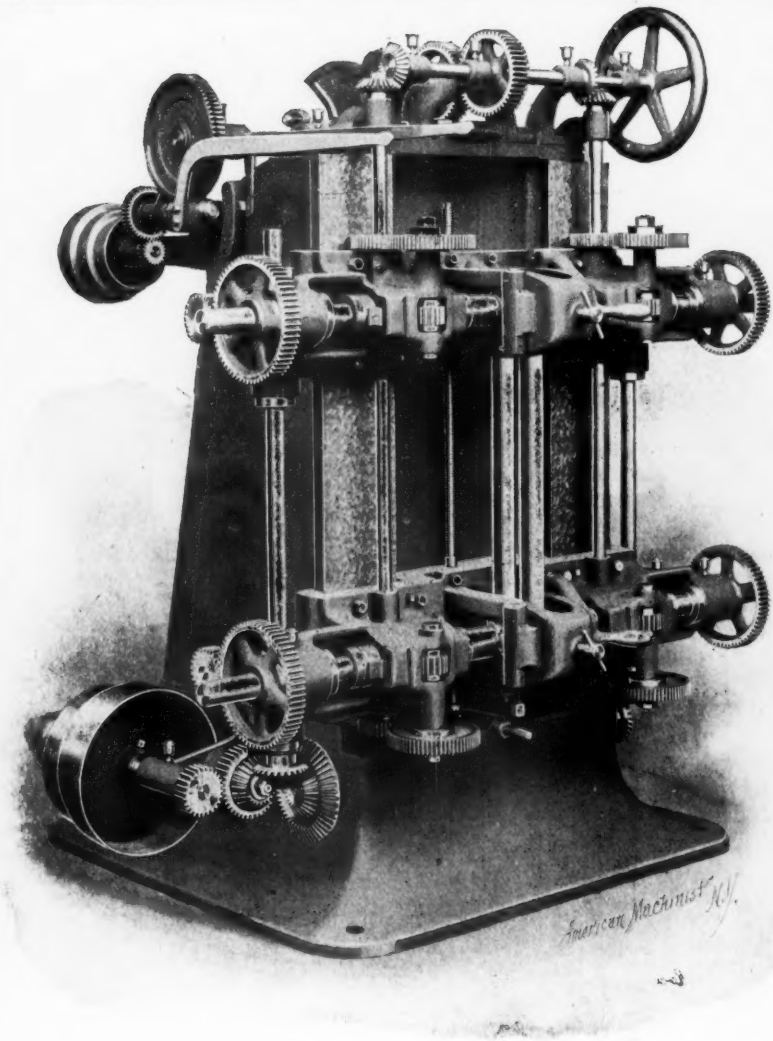


This is a Vibrator Molding Machine for Flasks 26x26.

Has 12" Draft and Power Ramming.

The Tabor Mfg. Co.

ELIZABETH, N. J.



We can save you money

on boring and facing your radiator sections if you will give us the opportunity. Here's a four spindle automatic machine that will turn out 600 loops per day and only requires the operator to put in and take out the work. We also build a four and a six spindle heater drill that will soon pay for themselves in output. Our new catalog will interest you. Send for it.

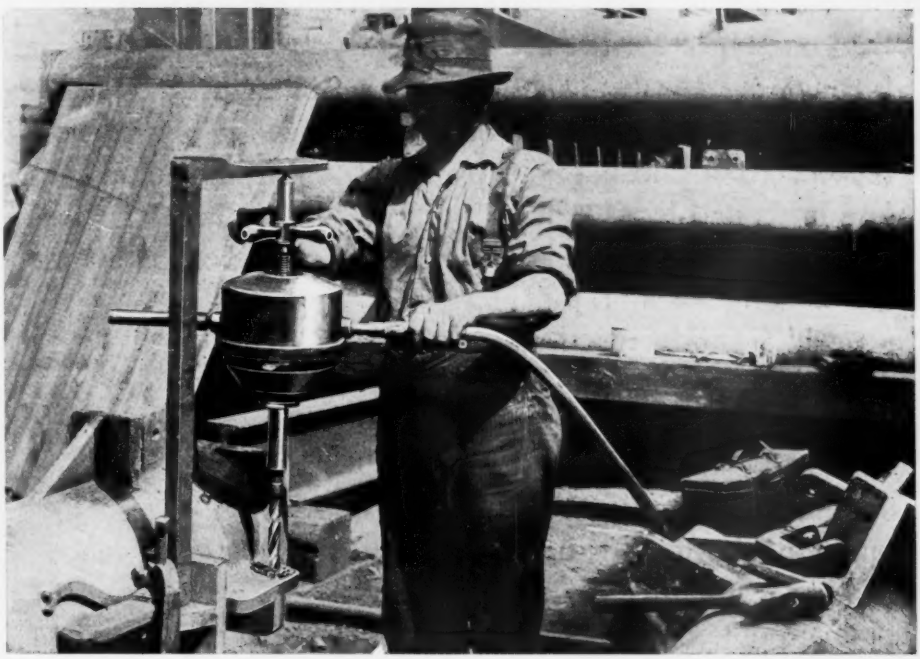
The Bickford Drill & Tool Company,

Cincinnati, Ohio, U. S. A.

Foreign Agents:--Schuchardt & Schutte, Berlin, Vienna, Cologne, Brussels, Stockholm, St. Petersburg. Charles Churchill & Co., Ltd., London, Birmingham, Manchester, Glasgow. Adphe Janssens, Paris and Brussels. F. W. Horne, Yokohama, Japan.

448

CHICAGO PNEUMATIC TOOL CO.



Pneumatic Tools in designs and sizes for **Foundry Work.**
Our Customers say: "They go beyond guarantee."

One man does the work of four with our

Chipping Hammers

For drilling, reaming and tapping use our

AIR DRILLS . . .

They are especially valuable on heavy work not readily put under your drill press, and drill and ream up to 3 inches in diameter in iron and steel.

Air Compressors and Hoists

We send our tools on trial subject to approval.

New York Offices:
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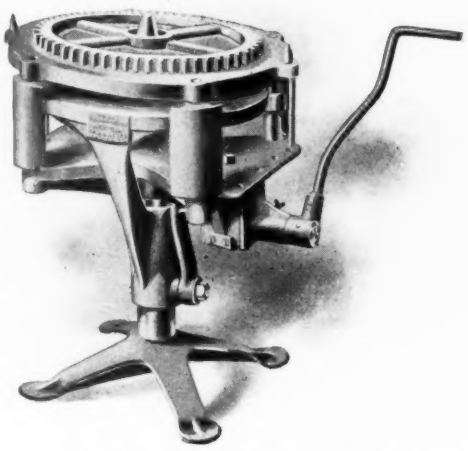
NEW YORK.

General Offices:
MONADNOCK BLDG.,
CHICAGO.

Competition

is getting stronger. The high prices of six months ago, with plenty to do for everybody, are gone. Whether you are making castings for yourself or for the use of others you are interested in turning out the best of work at the lowest cost. Everybody concedes that machine molded castings are more perfect than those made by hand. We can show you hundreds of places where the cost of molding has been reduced by more than half. Send us a sketch or a sample casting of the jobs on which competition is crowding you hard. It is more than likely that we can keep you ahead of the procession. We make no charges for furnishing estimates. The strong point in favor of the molding machines **WE** build is that they are made to order only, and consequently fit the jobs made on them. We have gotten up lots of machines for patterns which old foundrymen declared could only be molded by hand. No matter if your castings are crooked we can make machines to suit them.



GIVE US THE CHANCE NOW AND
BE READY FOR NEXT SEASON...

Maywood Foundry and Machine Co.

MAYWOOD, ILL.

You can't expect Good Cores

UNLESS YOU HAVE A GOOD CORE OVEN

The Core Oven which you use for drying heavy cores and molds is a mighty expensive place to dry your smaller cores.

In the first place you can not get a core when you may need it the worst. Small cores will break, and unless you have some way of drying a core quickly many a job must lay over until the next day.

Secondly you can not put a small core in your large oven without retarding the drying of the large cores. If you had a **Millett Oven** for your smaller cores you could leave the larger ones alone and secure perfect cores, both large and small.

Our last Catalog shows the **Millett Core Oven** and tells who uses them. **Want one?**

Millett Core Oven Co.

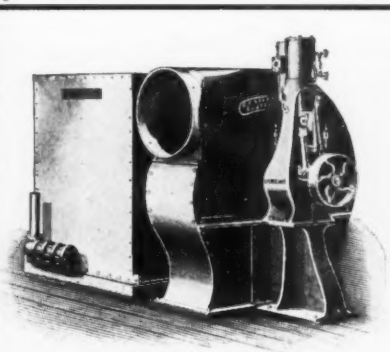
BRIGHTWOOD, MASS., U. S. A.

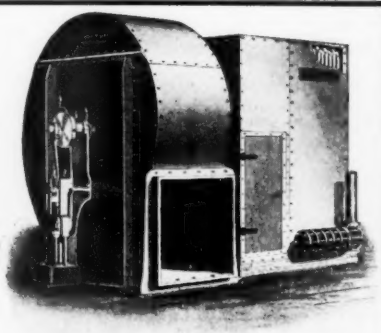
On Exhibition at and for sale by { *THE S. OBERMAYER CO., Cincinnati and Chicago.* / *THE J. W. PAXSON CO., Philadelphia.*

J. W. JACKMAN & CO., 39 Victoria St., London, S. W., Eng.

NEXT WINTERS HEATING SYSTEM

SHOULD BE SELECTED NOW





THE

STURTEVANT SYSTEM

POSITIVELY HEATS AND VENTILATES BY A FORCED CIRCULATION OF WARM AIR. NO SCATTERED STEAM PIPING. UTILIZES EXHAUST STEAM. :: :: ::

B. F. STURTEVANT CO. BOSTON

NEW YORK PHILADELPHIA CHICAGO LONDON

110

The Coburn Trolley Track

Is composed of two parts—the **Track** and the **Carriage.** Both are simple in construction, yet substantial and safe. **The Coburn Trolley Track** offers the cheapest method for handling materials yet devised. It is suitable for any place and condition. Send for list of users who say so. There are many foundrymen in the bunch. For carrying iron, molds, cores, sand, flasks, etc., **The Coburn Trolley Track** can't be beat. It will do away with about half of the gang of laborers you now have. At least this has been the experience of other shops. Write us for estimate of equipping your place with the **Coburn.** No charge whatever.

Coburn Trolley Track Mfg. Co.

HOLYOKE, MASS., U. S. A.

"LITTLE GIANT"

Pneumatic Hammers

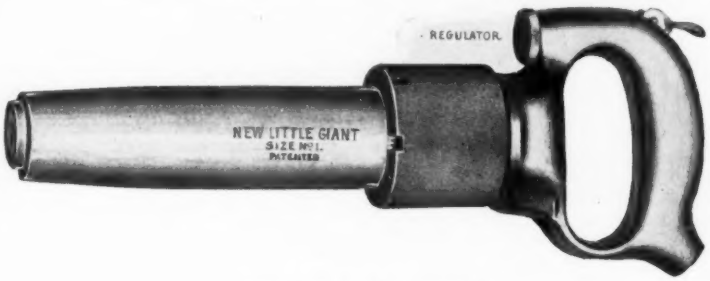
ARE ESPECIALLY DESIGNED FOR CHIPPING CASTINGS.

LIGHT. SIMPLE IN CONSTRUCTION.

DURABLE. EFFICIENT.

They have an air regulator which can be so adjusted as to admit a minimum amount of air and yet deliver a blow with full force of hammer under various pressures.

MADE IN ALL SIZES. Used in Foundries throughout the World.



SENT ON TRIAL. Guaranteed Against Repair for One Year.

SEND FOR CATALOGUE.

Standard Pneumatic Tool Co.,

Manufacturers Piston Air Drills, Boring Machines, Reversible Motor Chain Hoists, and all kinds of Pneumatic Tools and Appliances.

Main Office and Works, CHICAGO, U. S. A.

NEW YORK. LONDON. PARIS. BERLIN. ST. PETERSBURG

Of All Molding Sands

The **ZANESVILLE** is conceded to be the best. It is lasting, uniform in quality, abundant in quantity and found in grades to suit all classes of work. We have made a specialty of filling the foundrymen's wants for many years. The experience we have had is at your service. Just the right time of the year now to lay in your season's supply. The sand is nice and dry—no water to pay freight on. Better order now before there is a scarcity of freight cars. Lots of foundries were inconvenienced last year by not ordering early. For prices address:

E. M. AYERS,

ZANESVILLE, OHIO.

WESTERN REPRESENTATIVE:

H. S. VROOMAN, 220 West 20th St., CHICAGO, ILL.

Avoid trouble with your customers

Or in your own machine shop by using **Cherry Valley** iron in your castings. The ores, fuel and limestone composing this brand of iron are all selected with the utmost care.

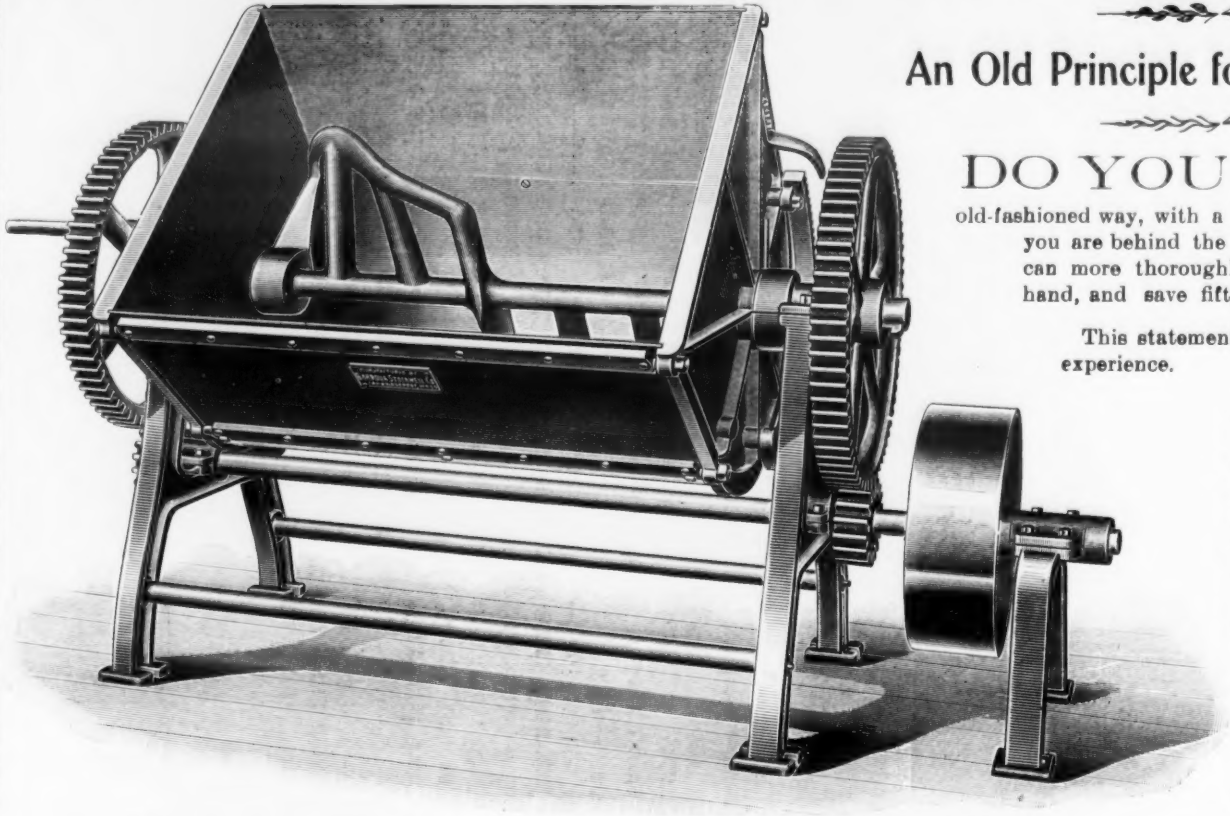
Cherry Valley Iron

Has been a standard for many years. For strength and softness combined it has no equal. If you find it difficult to please your customers, buy a carload of **Cherry Valley** and see what difference it makes to use a **Good Iron.**

The Cherry Valley Iron Co.

MURTLAND BUILDING, PITTSBURG, PA.

BOSTON FOUNDRY MIXER.



An Old Principle for a New Purpose.

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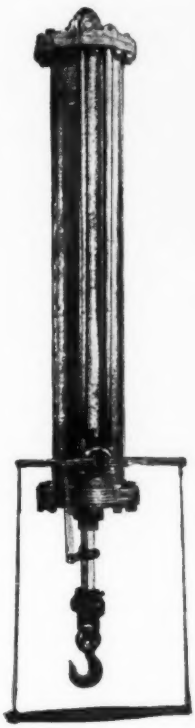

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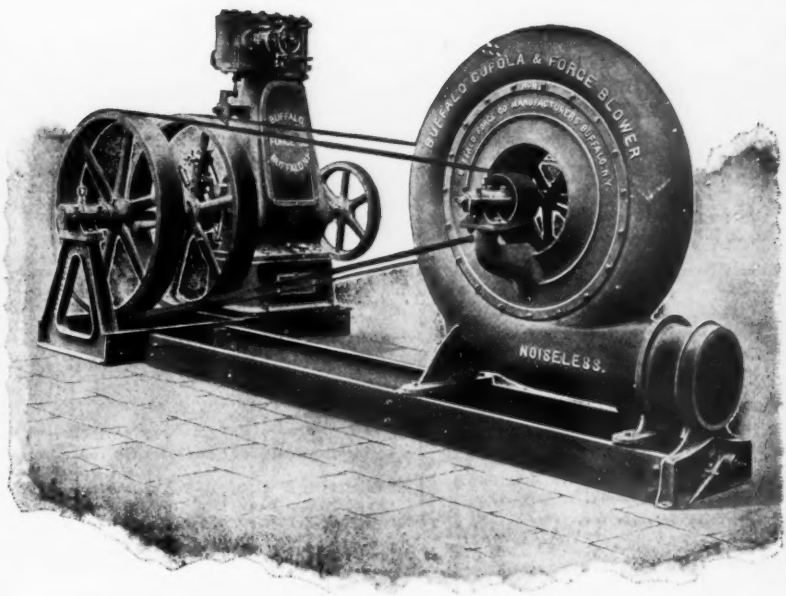

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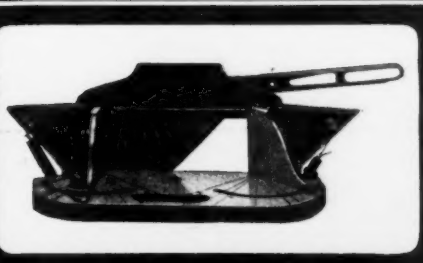

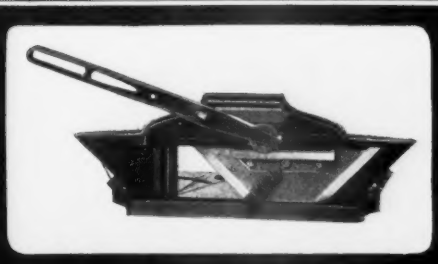

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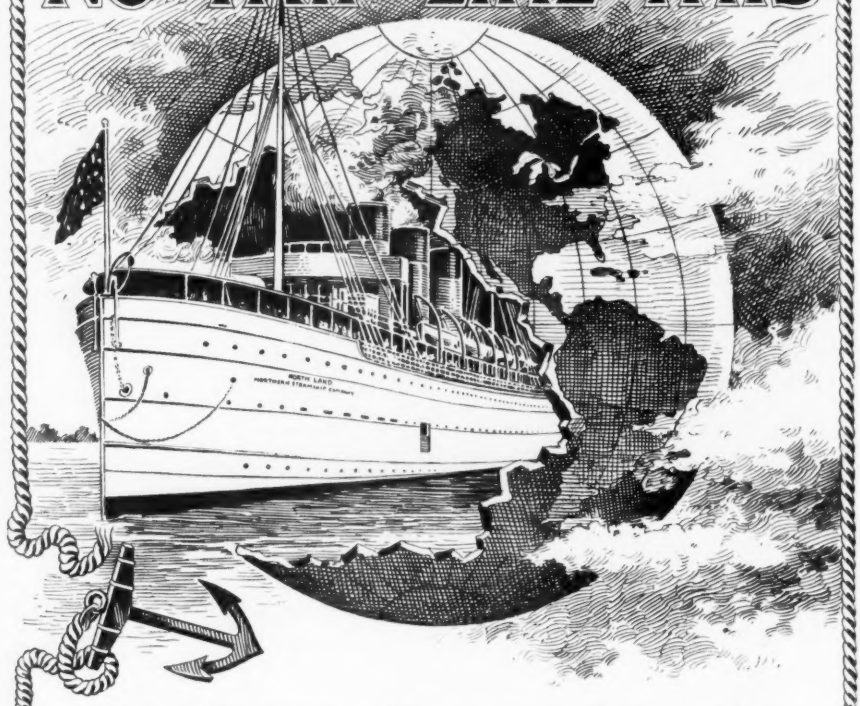

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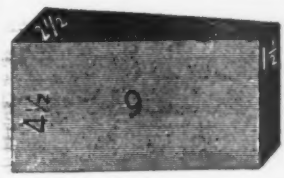

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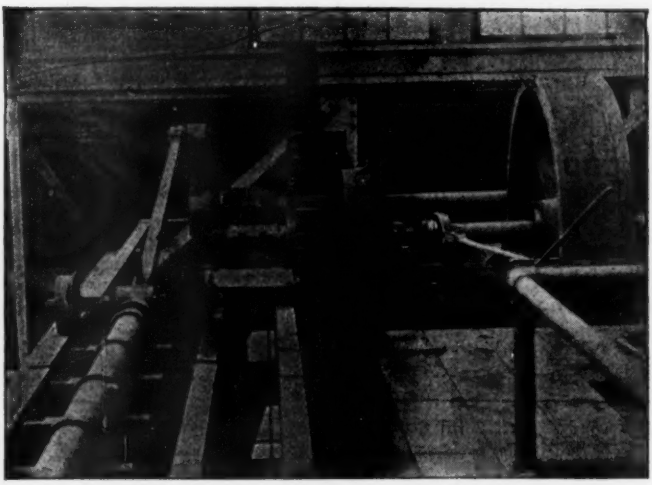

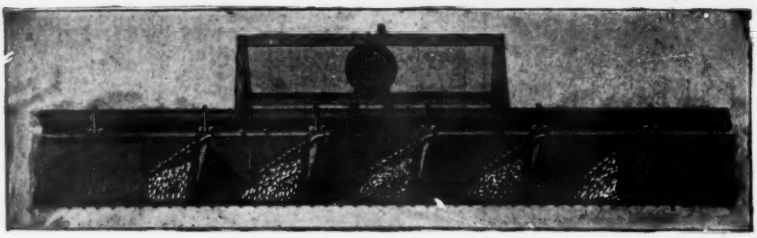

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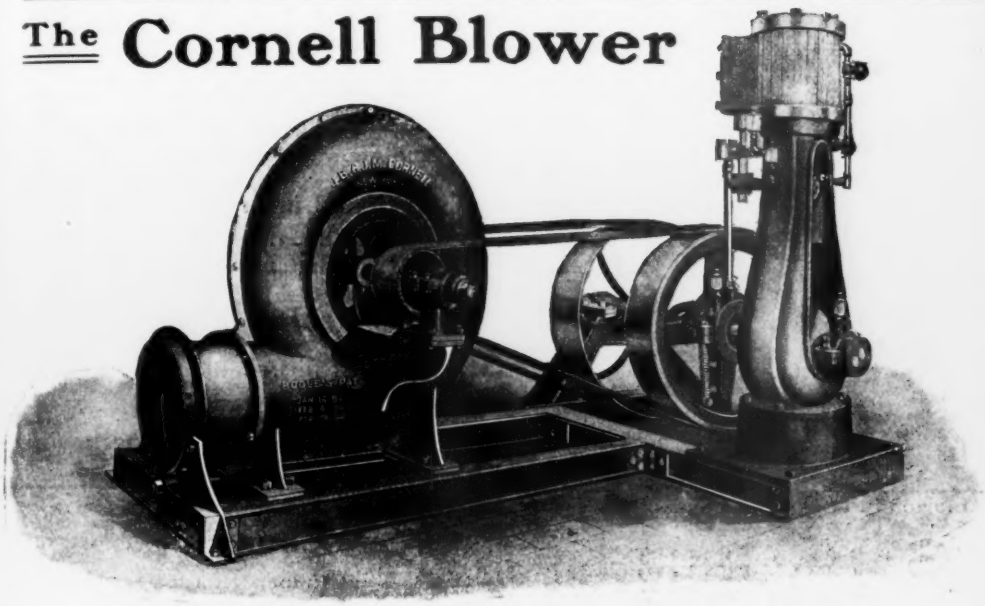

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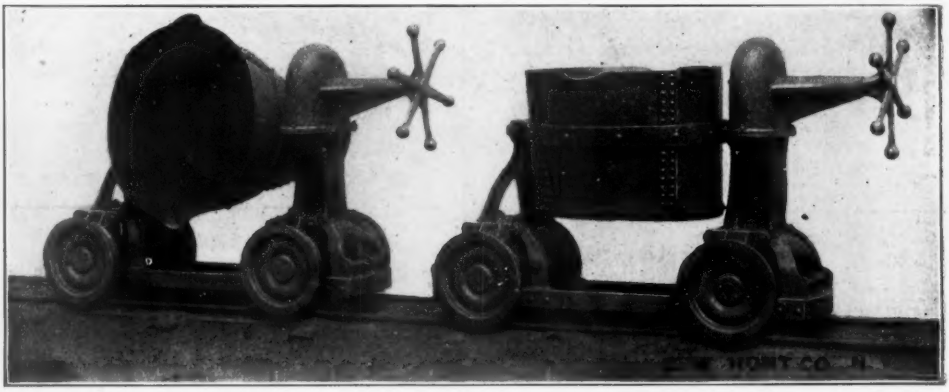

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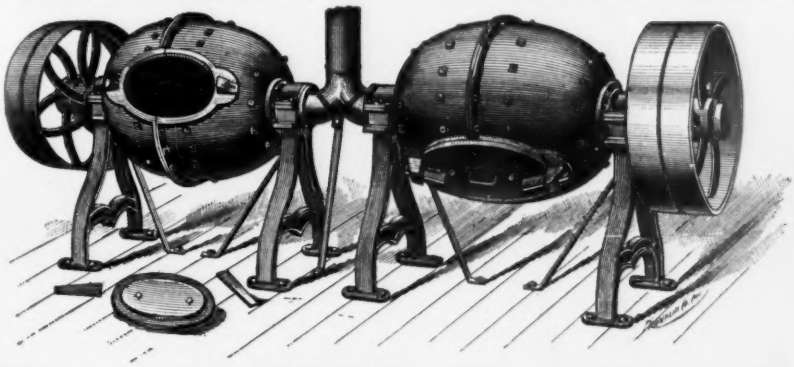

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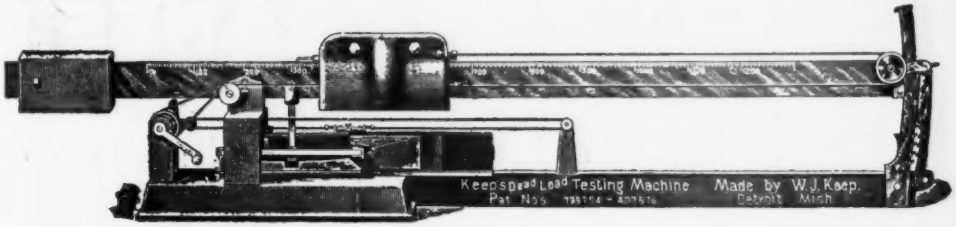

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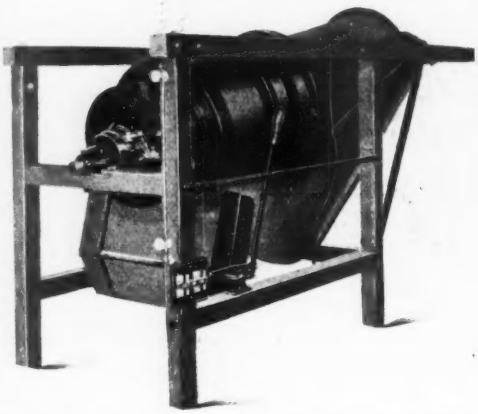

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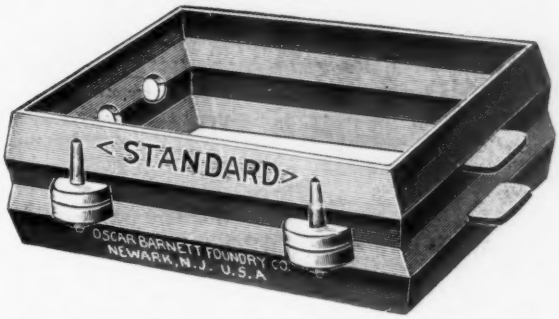

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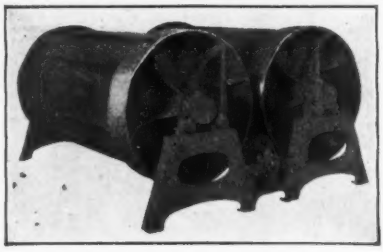

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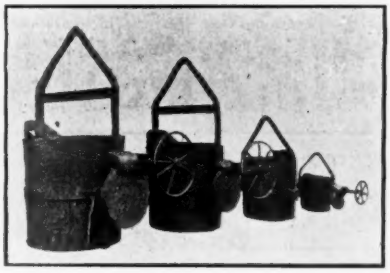

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